



FRACTURED TOOTH FRAGMENT REATTACHMENT: A CASE REPORT.

Dental Science

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ABSTRACT

Coronal fractures of the anterior teeth are a common form of dental trauma. Traumatic injuries of teeth involve varying degrees of damage to the supporting soft tissues or the teeth itself. Recent developments in restorative material, placement techniques, preparation designs, and an adhesive protocol allow clinicians to predictably restore fractured teeth. Among the various treatment options, reattachment of a crown fragment is a conservative treatment that should be considered for crown fractures of anterior teeth. Reattachment of fractured fragment is indeed a cost-effective conservative treatment. This case report discusses management of coronal tooth fracture case that were successfully treated using tooth fragment reattachment using fibre-reinforced post.

KEYWORDS

Tooth fracture, Reattachment, Tooth-colored restoration, Coronal fracture, Conservative treatment.

INTRODUCTION

Tooth trauma has been and continues to be a common occurrence that every dental professional must be prepared to assess and treat when necessary. It has no prescriptive method for occurring, possesses no significant predictable pattern of intensity or extensiveness, and has the uncanny knack for occurring at times when dentists are least prepared or when the dental office is closed. It may leave not only physical scars but also psychological impact on victim.^[1]

Coronal fractures of the anterior teeth are a common form of dental trauma that affects the primary and permanent teeth. Depending upon whether fracture involves the pulp organ or not, an anterior tooth fracture may be classified as complicated or uncomplicated fracture.^[2] This can range from simple enamel-dentin fractures to complicated crown-root fractures.^[3] Coronal fractures of permanent incisors represent 18–22% of all trauma to dental hard tissues, 28–44% being simple (enamel and dentin) and 11–15% complex (enamel, dentin and pulp).^[4] The majority of dental injuries involves the anterior teeth, especially the maxillary incisors (because of its position in the arch), whereas the mandibular central incisors and the maxillary lateral incisors are less frequently involved.^[5]

In complicated crown fractures management is quite challenging. Treatment options to restore traumatized teeth with complicated fractures may include root canal therapy followed by direct and indirect restorative procedures, such as composite restorations, ceramic restorations, and crowns with or without an intraradicular post. Such procedures are expensive, require long clinical sessions, and may reduce sound tooth structure. Direct or indirect restorative materials used in such cases may not be able to reproduce color, opacity, and translucency of sound tooth structure.^[9-11]

When the tooth fragment is present, the best option to restore the morphological, functional, and esthetic aspects of dentition will be fragment reattachment. It will not only maintain the shape, contour, texture, color, and alignment of natural teeth but also will be a fast, cost-effective solution, creating a positive psychological response in the patient.^[12] Reattachment serves as an interim restoration for young individuals who may need definitive procedures like direct adhesive veneers or crown if it fails. This article describes the successful management of fractured maxillary central incisors by reattachment

procedures.

CASE REPORT

A 15-year-old male patient presented to the dental clinic with a coronal fracture of the maxillary right and left central incisors due to a domestic fall 2 days before [Figure 1]. The patient also presented the fragments of the detached teeth that had broken due to trauma [Figure 3a, 3b]. On extraoral examination face was symmetrical with ell coordinated temporomandibular joint (TMJ) without any clicking sound and tenderness [figure 1]. Intraoral examination also revealed soft tissue laceration of upper and lower lips and there was no alveolar bone fracture [Figure 2a, 2b]. Clinical examination revealed a class III fracture in 11 and 21 with the fracture line running oblique from the gingival third of the tooth on the labial aspect to palatal aspect [Figure 2]. The probing depth was normal. A radiograph indicated complete root formation and a closed apex with no periapical radiolucency [Figure 4]. Thus, we came to a diagnosis of irreversible pulpitis with complicated crown fracture with maxillary right and left central incisors. All the treatment options were explained to the patient. The patient agreed to the option of immediate endodontic treatment of teeth 11 and 12 and reattachment of the fractured crown fragments by fiber post reinforcement. Informed consent was obtained from the patient. The teeth fragments were kept in normal saline to prevent dehydration till the reattachment.



Fig.1 Preoperative



Fig. 2a, 2b



Fig. 3a, 3b

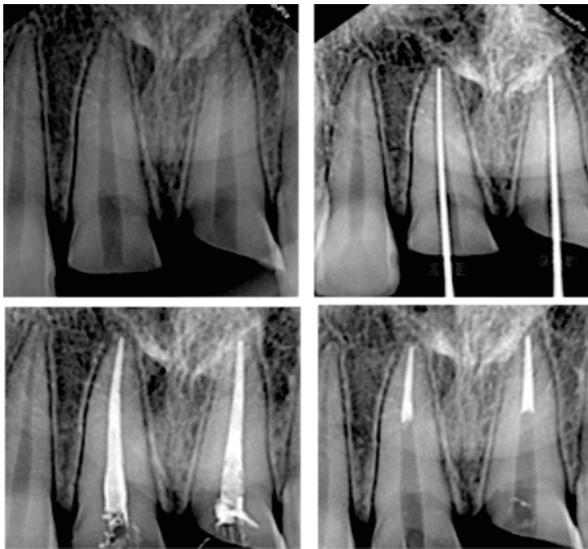


Fig. 5, 6, 7, 8 Radiographic examinations



Fig. 8 Fragment reattachment



Fig. 9 post-operative labial and palatal view



Fig. 10 Post-operative image

Local anesthetic using 2% lignocaine and 1:80,000 adrenalin (Proken-AD) was given. Access opening was performed with minimal tooth structure removal. Working length was determined using Root ZX apex locator and confirmed using radiograph [Figure 5]. Cleaning and shaping was performed using ProTaper Gold rotary file system (Dentsply) up to an apical size of ISO size 30. Saline and 5.25% sodium hypochlorite was used as an irrigant during the preparation. 17% ethylenediamine tetraacetic acid (EDTA) was used as final rinse. The root canal was dried with paper points and obturated using gutta-percha and AH Plus sealer (Dentsply) [Figure 6].

Post space was prepared using pesso reamers #1 and #2 leaving 5 mm of gutta-percha for apical seal [Figure 7]. The fiber post #2 was tried in the canal and adjusted to the desired length. A groove was prepared on the fractured fragment to allow venting of excess flowable composite resin. The alignment of the coronal fragment was verified with the post in place. The canal was etched for 20 seconds, followed by rinsing with water and air dried. Then bonding agent were applied and cured for 10 seconds. Later canal was injected with dual-cure resin (Luxacore) followed by insertion of fiber post (size 2) and final light curing for 20 seconds. The fragment was reattached to the tooth using flowable composite resin 3M ESPE [Figure 8]. Subsequently, finishing and polishing was done using finishing disks. The patient was instructed not to apply heavy pressure to these teeth and to follow proper oral hygiene practices.

On six months follow-up with teeth 11 and 21, the fragment showed a proper adaptation as well as good periodontal health with intact lamina dura and no evidence of root resorption [Figure 8].

DISCUSSION

Coronal fracture by trauma accounts for 92% of traumatic injuries affecting the permanent dentition, with the maxillary incisors being more involved^[1,6]. When compared to other procedures, tooth fragment reattachment is a more conservative, affordable, and less time-consuming treatment option with favourable advantages, such as original colour match, preservation of contour, contacts, and incisal translucency. The development of adhesive material creates new perspective in the reconstruction of fractured teeth; it is now possible to achieve excellent results with the reattachment of dislocated tooth fragment provided that the biological factors, materials and techniques are logically assessed and managed. The treatment modality varies from simple reattachment to complex interdisciplinary approach. The type of treatment depends on pulp vitality and the stage of root development or resorption. In complicated fractures, RCT followed by reattachment of the fractured segment with fiber post reinforcement is a feasible option. Factors that might influence the choice of technique include the need for endodontic therapy, extension of fracture, quality of fit between fragments and the fracture pattern. Out of wide variety of post systems available, tooth-coloured fiber post was considered to be

the best option with a number of important advantages such as esthetics, good bonding between post and cement, lower chair side time, and minimal tissue removal.^[13] Metal posts often cause catastrophic root fracture owing to higher elastic modulus than dentin. This leads to nonhomogenous and dangerous stresses in root dentin. Fiber post, on the other hand, best preserves the integrity of root. Lower modulus of elasticity, similar to dentin, creates root strain similar to that on intact tooth. Cavalleri and Zerman I 5 reported that the long-term prognosis for reattached crown fragments appears to be better than for composite resin restorations.^[14]

Wide variety of treatment protocols are available for reattachment procedures. Some techniques of fragment reattachment include a bonding procedure without any type of preparation of the remaining tooth or tooth fragment surfaces. This technique is called simple reattachment. However, some authors prefer tooth preparation in the form of external chamfering, over contouring or internal dentinal groove before bonding to aid in retention.^[9]

In this case report, no tooth preparation was performed to conserve the tooth structure, prevent the difference in color perception between tooth and composite resin, and allow adequate adaptation of the fragments. According to a systematic review by Poubel et al., simple reattachment can be considered as the currently preferred technique when there is complete fragment adaptation, compared with other reattachment techniques using over-contouring and dentinal groove preparation.^[9] An increase in the bond strength between tooth fragment and dentin was observed when an intermediate material was used and both the fragments had complete adaptation.^[9]

Single-visit root canal therapy was performed for both teeth. In dental literature, there is insufficient evidence to rule out whether there are important differences in outcomes between single-visit or multiple-visit RCT. There were no signs and symptoms of periapical infection and pulp sensibility test was nonreliable as trauma was recent. 5.25% sodium hypochlorite was used as an irrigant during the preparation. Earlier studies have reported conflicting results of the comparative effectiveness of hypochlorite at different concentrations; however, recent studies have confirmed the superiority of high concentration hypochlorite over 1% and 2% solutions.^[15] The resistance of the fracture segment can be directly proportional to the surface area of adhesion. The highest fracture resistance was obtained by chemically cured composite followed by light cured and resin cement and least by only dentin bonding agent. In this case vents was created palatally to remove excess flowable composite resin and precisely align the fragment with the remaining tooth structure.

The newer variety of nonmetallic posts are made of either ceramic or fiber reinforced materials like carbon, quartz or glass in an epoxy matrix. By using glass fiber post with composite core and with recent advances in adhesive techniques and materials, one can create a monoblock, a multilayered structure with no inherent weak inter-layer interfaces. Therefore, the integrity of the final endodontic-restorative continues monoblock approaches that of the original healthy tooth itself.^[16] In this case, post space preparation was kept minimal to conserve the natural tooth structure and not deteriorate the fracture resistance of restored tooth.

If the fracture line is supragingival, the procedure for reattachment will be straight forward. However when the fracture site is subgingival or intraosseous, orthodontic extrusion with a postretained crown may be necessary. Alternatively, surgical techniques such as electro surgery, elevation of tissue flap, clinical crown lengthening surgery with removal of alveolar bone and removal of gingival overgrowth for access to the fractured site are all viable methods for bonding fractured component. It has been suggested that whenever the fracture site invades the biologic width, surgery should be performed with minimum osteotomy and osteoplasty (Barteiri et al 1990).

CONCLUSION

The overall knowledge of dental emergencies and their management seems to be unsatisfactory both among lay people and caregivers. Despite crown fractures' higher frequency, knowledge regarding tooth fracture management seems to be relatively lower than tooth avulsion. Reattachment proved to be a successful technique in these cases for restoring immediate esthetics and function. Reattaching a tooth fragment with dual cure adhesives may be successfully used to restore fractured teeth with adequate strength. Having a unified protocol for

the management of the traumatized tooth would help keep the protocols as simple as possible, which could eventually lead to an easier and more rapid spread of information.

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