

FRACTURED TOOTH BACK TO ITS NATURE: CASE SERIES

Ahirwar A,¹ Jain PR,² Singh MP,³ Singh G⁴

1. Post Graduate Student, Department of Conservative Dentistry & Endodontics, Peoples College of Dental Sciences, Bhopal, MP
2. Post Graduate Student, Department of Conservative Dentistry & Endodontics, Peoples College of Dental Sciences, Bhopal, MP
3. Professor & Head, Department of Conservative Dentistry & Endodontics, Peoples College of Dental Sciences, Bhopal, MP
4. Reader, Department of Conservative Dentistry & Endodontics, Peoples College of Dental Sciences, Bhopal, MP

Abstract

Traumatic injuries of maxillary anterior teeth are the main cause of emergency treatment in dental practice. There are several treatment modalities for such condition, reattachment of fractured fragment is one of them. Tooth fragment reattachment offers a conservative, esthetic, and economic restorative option that has been shown to be an acceptable alternative to the restoration of the fractured tooth with resin-based composite or full-coverage crown. This case reports on two coronal tooth fracture cases that were successfully treated using adhesive reattachment technique.

Key words: Dual cure resin, Esthetics, Fibre post, Fragment Reattachment.

Introduction

Fracture of maxillary permanent anterior teeth in young and adolescents is the most common traumatic injury.¹ The anterior incisors are most often affected (80% central incisors and 16 % lateral incisors) because the anterior position of the maxilla and tooth protrusion followed by mandibular incisors.² Falls, collisions, sport injury, violence and traffic accidents are the main causes of the tooth fracture.^{3,4} Tooth fractures are always associated with biological, socioeconomic conditions, emotional and behavioural factors.⁵ The manifestations may range from simple enamel-dentin fracture to complicated crown-root fracture or root fracture, but the most common one is the crown fracture.⁶ Previously such cases were treated with pin retained resin, jacket crown, orthodontic bands and composite resins.^{2,7} However no restorative material can replicate the aesthetic characteristic of the natural tooth structure, now The development and use of fibre-reinforced composite root canal posts make possible of the reattachment of the crown aesthetically. In complex traumatic cases, endodontic, periodontal, orthodontic and surgical procedures may be required.⁸ this article elucidates esthetic rehabilitation of three clinical cases with fractured central incisors. Reattachment of fractured incisal edges was done using fibre post systems. Dual cure resin cement was used for luting of the posts to the teeth.

Case reports

CASE I

Two patients were referred to the Peoples College of Dental Sciences and Research Centre, Department of Endodontics, after sustaining a complicated crown fracture to their maxillary incisor following trauma. One was a 25 year old male patient with his fractured maxillary left central incisor. Second case was a 30 year old male patient with his fractured maxillary right lateral incisor.

In the first case clinical and radiographic examination (figure 1a & 1b) showed an oblique crown fracture in the maxillary left central incisor due to a road traffic accident. Fracture line runs from cervical part of tooth on mesial aspect to the middle third of the tooth on distal aspect.



Figure 1a: - Preoperative view



Figure 1b: - Preoperative Radiograph

Patients medical history was unremarkable. Fractured fragment was mobile and loosely attached to the tooth and there is little injury on the soft tissues, suturing was present on the lower lip. On the basis of radiographic examination there was no associated root fracture. It was planned to perform single visit root canal treatment followed by reattachment with fibre post reinforcement. Local anaesthesia was given and detachment of fractured mobile coronal fragment (figure 1c) was removed with the help of locking twizzer.



Figure 1c: - Retrived fractured segment

Fragment was then cleaned with 2% chlorhexidine and was kept in normal saline solution. Access opening was done on the 21 with endoaccess bur (DENTSPLY maillefer, Switzerland) with a high speed air-turbine handpiece (NSK pana air, Japan). Working length was determined with the 10 no. K file (DENTSPLY maillefer) with the help of taking a radiograph. Biomechanical preparation was done by using step back technique and master cone determination was done (figure 1d).



Figure 1d: - Master cone determination

Obturation was done with gutta percha (DENTSPLY maillefer) and AH Plus sealer (DENTSPLY, Germany) by using lateral condensation technique (figure 1e).



Figure 1e: - Obturation done

After completion of the root canal treatment post space was done by using paeso reamer and removed the gutta percha from the coronal two third of the canal (figure 1f).

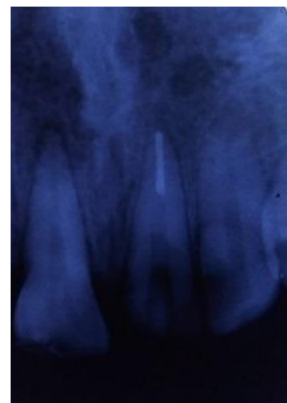


Figure 1f: - Post space preparation

Post space was then irrigated with 17% EDTA (Prevest Denpro), 5% sodium hypochloride (Neelkanth health care) and distilled water. Canal was then dried with paper points. Fibre post (Parapost-Fiber lux, Coltene Whaledent) was then tried to place on the desired place and access was also made on the fragment to receive the post (figure 1g & 1h).



Figure 1g: - Access preparation



Figure 1h: - Checking of Post fit

After getting the desired fit of the fragment it was stored in distilled water. Canal was etched with 37% phosphoric acid for 15 seconds and then rinsed with water, excess water was removed from the canal by using cotton and paper points. Adhesive was applied on the canal as well as the post and light cured. Post was cemented with the dual cure resin cement (Variolink II, Ivoclar vivadent). The patient had

recalled on every 3 months. It was observed that both endodontic and restorative treatments were clinically acceptable through each visit. (figure 1i & 1j)



Figure 1i: - Postoperative radiograph



Figure 1j: - Postoperative view

CASE 2

A 30 year male patient reported to the Department of Conservative Dentistry & Endodontics, 2 hours after sustaining a crown fracture of his maxillary right lateral incisor during Road Traffic Accident. Clinical examination revealed a fracture line at the cervical area of the upper right lateral incisor. (figure 2a & 2b)



Figure 2a: - Preoperative view

The maxillary right central and lateral incisor was tender on percussion. Lateral incisor had a mobile coronal fragment. Central incisor exhibits mobility. Radiographic observation revealed a fracture line at the cervical area of the upper right lateral incisor. (figure 2c)



Figure 2b: - Palatal View

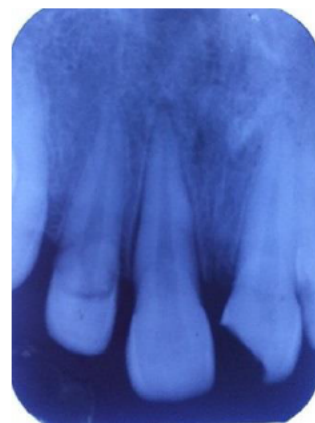


Figure 2c: - Preoperative radiograph

A diagnosis of crown fracture was made for the lateral incisor and subluxation for the central incisor. To manage the subluxation and stabilize the mobility used a wire for splinting. (figure 2d)



Figure 2d: - Wire splinting

Single visit root canal treatment and immediate reattachment of fractured fragment along with the fibre post was planned. Under local anaesthesia, Access was made on the lateral incisor. Pulp tissue from the root canal was extirpated. Working length was determined radiographically (figure 2e) and confirmed by apex locator. Cleaning and shaping of the root canal was done followed by obturation. (figure 2f) Post space was prepared. (figure 2g)

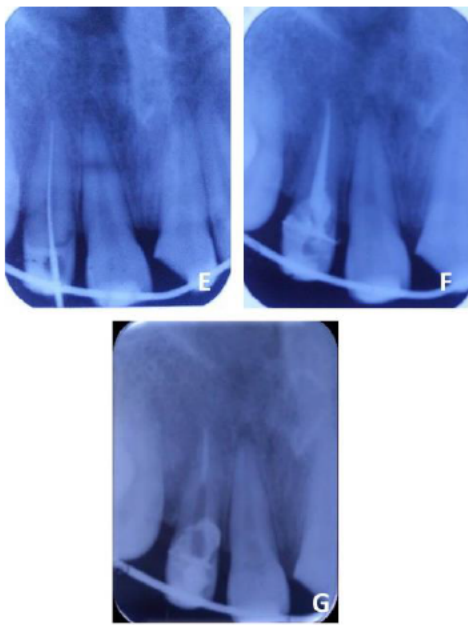


Figure 2: e: - Working length determination
 f: - Obturated tooth
 g: - Post Space preparation

A prefabricated fibre post (Parapost-Fibre lux, Coltene Whaledent) was selected. An indentation was made on the fractured crown fragment with a large round bur to act as a retentive area and to receive the post. The alignment of the coronal fragment was assessed with the post in position. The root canal was then etched using 37% phosphoric acid for 15 seconds and thoroughly 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. Dual cure resin (Rely-X, 3M) was placed in the canal and the fibre post was placed up to proper length. The inner surface of the coronal fragment was similarly etched and bonded to the tooth with dual cure resin composite. The excess material was removed and the reattached tooth and that radiograph was taken. (figure 2h)



Figure 2h: - Post placement

The patient had recalled after 2 weeks for splint removal then after the patient had recalled on every 3 months. It was observed that both endodontic and restorative treatments

were clinically acceptable through each visit. (figure 2i; 2j & 2k)

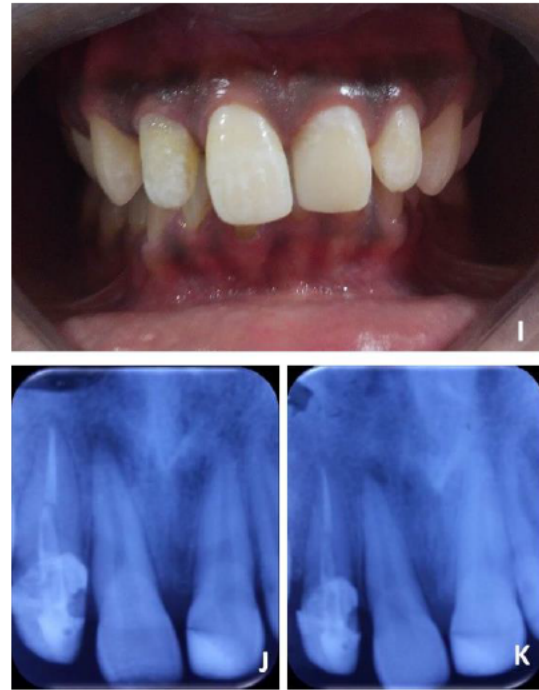


Figure 2: i: - Postoperative view
 j: - Postoperative radiograph
 k: - 6 months follow-up

Discussion

Fractured tooth in a patient always provides emotional and physical disturbances. It is a clinical challenge for a dentist to regain the functional, esthetic and biologic restoration of the fractured tooth and to provide emotional support to the patient.⁹ Many conventional treatments like composite resin, laminate veneer, partial or full coverage crowns are time consuming, high priced and not conservative for a fractured tooth treatment.¹⁰ If there is no luxation injury, reattachment technique can be considered.¹¹ Reattachment is the best method whenever it is possible because it offers the natural colour, shape, texture and esthetic to the tooth. It is preferred due to its low cost and also takes less time during procedure.¹² There are many factors responsible for the long term success of this treatment. There should be adequate hydration during storage and whenever the fragment outside the mouth during procedure. The vitality and esthetics of the tooth maintained due to hydration.¹³ It ensures adequate bond strength.¹⁴ The adhesive system provide the high bond strength between the fragment and the traumatized tooth.¹⁵ The first case was published in the 1964 by Chosack and Eildeman, on the reattachment of a fractured incisor fragment in which complicated tooth fracture was managed by root canal treatment followed by a cast post and core.¹⁶ It was reported that the use of a fibre post with fractured teeth, as resin based restorative material interlocks the two fragment, minimizes the stress on the reattached tooth fragment.¹⁷ Root canal treatment is performed prior to the reattachment procedure in a

complicated crown fractures, the pulp chamber can be used to give greater retention to the fragment.¹⁸ Post after root canal treatment provides mechanical support for the fractured fragment. The use of a custom cast post^{19,20} as well as prefabricated post.^{12,21,22}

Conclusion

We have to educate the population to preserve the fractured tooth segment during tooth injury.²³ This reattachment procedure provides maximum conservation of the tooth structure. It is an inexpensive, viable and feasible alternative that can restore function and esthetic of the fractured teeth.

References

1. Reis A, Loguercio AD. Tooth fragment reattachment: current treatment concepts. *Pract Periodontics Aesthet Dent* 2004;16:739-40.
2. Belcheva A. Reattachment of fractured permanent incisors in schoolchildren (review). *ASDC J Dent Child* 1998;65:492-4.
3. Andreasen JO, Andreasen FM. Textbook and color atlas of traumatic injuries to the teeth. 3rd ed. Copenhagen: Munksgaard; 1994.
4. Gutmann JL, Gutmann MS. Cause, incidence and prevention of trauma to teeth. *Dent Clin North Am*. 1995;39:1-13.
5. Nicolau B, Marcenes W, Sheiham A. The relationship between traumatic dental injuries and adolescent's development along the life course. *Community Dent Oral Epidemiol* 2003;31:306-13.
6. Holan G, Shumeli Y. Knowledge of physicians in hospital emergency rooms in Israel on their role in cases of avulsion of permanent incisors. *Int J Paediatr Dent* 2003;13(1):13-9
7. Saha SG, Saha MK. Management of a fractured tooth by fragment reattachment a case report. *International Journal of Dental Clinics* 2010;2(2):43-7.
8. Olsburgh S, Jacoby T, Krejci I. Crown fracture in the permanent dentition: pulpal and restorative considerations. *Dent Traumatol* 2002;18:103-15
9. Kadam N, Deataide I, Fernandes M. Management of a complicated crown fracture of the permanent central incisor by fragment reattachment. A Case report. *Cariology* 2014;4(1):22-7.
10. U. Is,eri, Z, Ozkurt E, Kazazo glu. Clinical management of a fractured anterior tooth with reattachment technique: a case report with an 8-year follow up. *Dental Traumatology* 2011;27(5):399-403.
11. Giorgio R, Claudia M, Angelo P. Clinical procedures for the immediate reattachment of a tooth fragment. *Dent Traumatol* 2002;18:281-84.
12. Zorba YO, Ozcan E. Reattachment of coronal fragment using fiber-reinforced post: a case report. *Eur J Dent* 2007;1:174-78.
13. Baratieri LN, Monteiro S Jr, Andrada MAC. The "sandwich" technique as a base for reattachment of dental fragments. *Quintessence Int* 1991;22:81-5.
14. Perdigao J, Van Meerbeek B, Lopes MM, Ambrose WW. The effect of a re-wetting agent on dentin bonding. *Dent Mater* 1999;15:282-95.
15. Demarco FF, Fay RM, Pinzon LM, Powers JM. Fracture resistance of re-attached coronal fragments – influence of different adhesive materials and bevel preparation. *Dent Traumatol* 2004;20:157-63.
16. Kanca J. Replacement of a fractured incisor fragment over pulpal exposure: A long-term case report. *Quintessence Int* 1996;27:829-32.
17. S.N. Akyuz and A. Erdemir, "Restoration of tooth fractures using fiber post and fragment reattachment: three case reports," *European Journal of General Dentistry* 2012;1(2):94-8
18. Goenka, et al. Biological approach for management of tooth trauma. *Journal of indian society of pedodontics and preventive dentistry* 2011;29(2):180-6.
19. Kavitha T, Rao CVN, Lakshmi NL. Reattachment of fractured tooth fragments using a custom fabricated dowel—three case reports. *Endodontol* 2000;12:65-70.
20. Goenka P, Marwah N, Dutta S. Biological approach for management of anterior tooth trauma: Triple case report. *J Indian Soc Pedod Prev Dent* 2010;28:223-29.
21. Adanir N, Ok E, Erdek Y. Reattachment of subgingivally oblique fractured central incisor using a fiber post. *Eur J Dent* 2008;2:138-41.
22. Wadhvani CPK. A single visit, multidisciplinary approach to the management of traumatic tooth crown fracture. *Br Dent J* 2000;188(11):593-98.
23. Thejokrishna P, Prabhakar AR, Kurthukoti AJ : Reattachment Of Embedded Tooth Fragment: A Case Report. *Annals and essence of dentistry*, 2010;2(3):77-81.

Corresponding Author

Dr. Anupama Ahirwar
 Postgraduate student
 Department of Conservative dentistry and Endodontics
 Peoples College of Dental Sciences and Research
 Centre, Bhopal, Madhya Pradesh.
 Peoples Campus, Bhanpur, Bhopal- 462037
 Email- anupama16288@gmail.com