Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/mjafi

Case Report

Single visit reattachment of fractured incisal edges using different post systems

Maj S. Anil Kumar^{a,*}, Col V. Radhakrishnan^b, Maj Pankaj Juneja^c,
Rajesh Panchneni^d

^a Graded Specialist (Prosthodontics), Military Dental Centre, Secunderabad 500015, India

^b Classified Specialist (Oral and Maxillofacial Surgery), Commanding Officer, Military Dental Centre, Secunderabad, India

^c Graded Specialist (Orthodontics), Military Dental Centre, Secunderabad, India

^d Senior Lecturer, Sri Sai College of Dental Surgery, Vikarabad, Hyderabad, India

ARTICLE INFO

Article history:

Received 30 December 2012

Accepted 22 April 2013

Available online 2 August 2013

Keywords:

Fibre post

Reattachment

Fractured incisal edges

Introduction

Fracture of maxillary permanent anterior teeth in young and adolescents is the most common traumatic injury.¹ 80% of the injury occurs to maxillary central incisors because of the anterior anatomical position and the protrusion caused by the eruptive process.² 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.³ Individuals with Class 2 Div 1 malocclusion (central incisors more labially placed) commonly suffer with traumatic injuries of teeth.² 5–8% of traumatic injuries involve

crown and root with pulpal exposure.^{2,4} Uncomplicated enamel-dentin fracture is also common. Prior studies have estimated that one out of every four persons under the age of 18 will sustain a traumatic dental injury in the form of anterior crown fracture.^{5,6} These reports confirm that dentists are confronted with managing dental trauma and restoring fractured teeth on a regular basis. Numerous modalities of treatment have emerged in the recent years for esthetic and functional restoration of fractured anterior teeth. If the fractured fragment is not available direct or indirect restorations can be done.⁷ If the fractured portion is intact with correctly preserved margins then adhesive reattachment should be the first line of treatment.⁷ Tennery was the first to report the reattachment of a fractured fragment using acid etch technique.⁸ Reattachment of fragment helps to achieve better esthetics, lifelike translucency, immediate rehabilitation for the patient and a positive emotional and social response from the patient. Recent advancements in the restorative dentistry include introduction of glass fiber posts which offer better esthetics and dual cure resin luting cements for cementation of posts.⁹

A review of literature of reattachment procedures discusses no additional tooth preparation to various preparation options such as circumferential bevel, internal groove, external chamfer and superficial overcontour of composite of fracture line.¹⁰ Rais and Pusnam^{11,12} have stated that the minimum strength for ensuring long term clinical success of the reattachment is still unknown. With improvements in adhesives and newer materials that offer high bond strength

* Corresponding author. Tel.: +91 9490434309 (mobile).

E-mail address: anil_virgo_d@yahoo.co.in (S. Anil Kumar).

0377-1237/\$ – see front matter © 2013, Armed Forces Medical Services (AFMS). All rights reserved.

<http://dx.doi.org/10.1016/j.mjafi.2013.04.011>

values, some investigators have attempted to reattach fragments using these materials without an additional retentive preparation.^{13,14} Patients having undergone reattachment procedures for fractured anterior teeth have to undergo regular follow-ups to check the stability of the tooth-adhesive-fragment complex over time with the help of intraoral radiographs and clinical assessment after the treatment.

This article elucidates immediate esthetic rehabilitation of two clinical cases with fractured central incisors. Reattachment of fractured incisal edges was done using two different glass fiber post systems. Dual cure resin cement was used for luting of the posts to the teeth.

Case reports

Two case reports will be discussed with fractured maxillary anterior teeth. The first one describes a 13-year-old boy who reported to Military Dental Centre Secunderabad, following fracture of maxillary right and left central incisors [Fig. 1]. Trauma had occurred while the child was playing football in the school. The patient's medical history was not significant. Intraoral examination revealed a Ellis class III fracture of both maxillary central incisors. Patient had stored the fractured segments in a plastic cover containing water. Patient reported within the first hour of injury. Immediately the fractured segments [Fig. 2] were placed in a bowl containing normal saline to prevent discoloration and dehydration. A periapical radiograph showed that the root formation was complete. The parent of the patient was in a state of trauma and very apprehensive and requested for the possibility of immediate reattachment of the broken fragment. Both the patient and the parent were calmed and a detailed treatment plan was given to them. The treatment plan included single visit root canal treatment followed by reattachment of the tooth using a fiber post.

Local anesthesia {2% Lignospan, Septodont®} was administered. Before starting with the invasive procedure the fractured segments of both the incisors were checked for the continuity, both the fragments adapted well to the fractured tooth. Access cavity preparation was done and the working length determined. The root canals were enlarged to ISO size

Fig. 1 – Preoperative intraoral photograph showing fractured maxillary central incisors.

Fig. 2 – Photograph showing fractured segments.

80. Thorough irrigation was done with 2.5% sodium hypochlorite and normal saline. The canals were dried with paper points and obturated using lateral condensation technique with gutta percha and resin sealer [Fig. 3]. The gutta percha was removed from the coronal two third of the canals [Fig. 4] using the drill provided in the fiber post kit {Para Post Fiber Lux System, Coltene Whaledent®}. Different diameter posts are available in the kit. In our case size 6 posts from the kit were used for both the central incisors. The fiber post was tried in the canal and adjusted to the desired length [Figs. 5 and 6]. The fractured portions were disinfected with 0.2% chlorhexidine. Space was prepared on the palatal aspect of the fractured incisors to receive the coronal portion of the post [Fig. 7]. The position of the fractured segments was assessed. Root canals were etched with 37% ortho phosphoric acid and rinsed after 30 s. Bonding agent {Scotchbond MP®} was applied and the post was luted in the canal using dual cured resin luting cement {Voco dual cured LC®}. The inner portion of the coronal fragments were similarly etched and bonded to the tooth using dual cure flowable core build-up material {Voco dual cure core build-up, Rebuilda®} [Fig. 8]. The fracture line labially

Fig. 3 – Radiograph showing RCT of both maxillary central incisors'.

Fig. 4 – Radiograph showing post space preparation.

was masked using composite resin {Esthetx, Dentsply®} [Fig. 9]. Centric and eccentric contacts were checked using the articulating paper and post-operative instructions were given to the patient. Patient was advised to avoid excessive load application on the maxillary incisors. Post-operative follow up was carried out after 1 week and subsequently at 3, 6 and 12 months. The teeth were in function with no signs of any periapical radiolucency at the end of one year.

The second case describes a 12-year-old boy who reported to Military Dental Centre Secunderabad, with fracture of right maxillary central incisor [Fig. 10]. Trauma occurred due to accidental fall while climbing the stairs. Patient reported half

Fig. 5 – Photograph of post try in of maxillary left central incisor.

Fig. 6 – Photograph of post try in of maxillary right central incisor.

an hour after injury. On clinical examination Ellis class III fracture of maxillary right central incisor was noticed. The patient was not in possession of the fractured incisal edge. Immediately the parent of the child was advised to visit the location where the trauma had occurred and find the fractured tooth segment. The fractured tooth fragment was located and brought by the parent storing in normal saline within 2 h of injury. Medical history of the child was not significant. Single visit root canal treatment was performed as discussed in report 1. All the steps were similar except for the fiber post system. In this case prefabricated Quartz fiber post system {RTD Fiber post®} [Fig. 11] was used. Remaining procedures were done in a similar fashion as described in report 1. Post-operative check up was done at 3, 6 and 12 months [Fig. 12]. The treated tooth was in function with no post-operative complications.

Discussion

Restoration of fractured anterior teeth in young and adolescents is a daunting clinical challenge. The fracture of the tooth

Fig. 7 – Photograph showing space created in the fractured segment.

Fig. 8 – Photograph of reattached teeth fragments.

Fig. 11 – Fiber post cemented.

Fig. 9 – Photograph showing composite finishing.

is the most traumatic incident to a young patient. Restoration and repair of such teeth have to be undertaken very precisely because any alterations in the attachment procedures may lead to compromised esthetics. Advancements in the field of restorative dentistry have simplified the treatment procedures offering favorable prognosis.¹⁵ With regard to the clinical success the incisal fragment should exhibit negligible loss of tooth structure. The absence of traumatic occlusion should be

confirmed.¹⁶ Post and core foundation is recommended when there is more than 50% loss of coronal tooth structure as suggested by Hayashi et al.¹⁷

The clinical cases described in this article highlights reattachment of fractured anterior teeth. The article also highlights on the most conservative management of traumatized teeth. Two different post systems were used in the reattachment of the tooth fragment. In the first case Para Post system®, [Coltene Whaledent] was used. It has a rounded head design to reduce stress and locks in composite core material. It has adequate translucency to light source. The only drawback of this system is in cases of teeth having large pulp chambers the maximum sized diameter of the post doesn't snugly fit thus compromising the stability of the post. In the second case quartz fiber post [RTD system®] was used. The post in this system is designed with a series of serrations and passive threading cut into the surface, to provide self-retention regardless of the cementation media used. It has a flexural strength of 1600 Mpa. Restoration with cast metal posts can cause wedging forces coronally resulting in irreversible failure.¹⁸ Studies have indicated that dentin bonded resin post and core system provide significantly less resistance to

Fig. 10 – Preoperative photograph of fractured right maxillary central incisor (Case 2).

Fig. 12 – Reattachment of tooth fragment.

failure.¹⁹ The use of natural tooth fragment for reattachment reduces the difficulties encountered in reproducing natural contour texture and contour as compared to the direct restorative materials.²⁰ In both the cases treated by us the reattached fragments were in proper function for a period of 1 year without any dislodgement of the reattached fragment.

Conclusion

Reattachment of fractured incisal fragments offers a conservative and esthetic restorative procedure. To improve the stability and esthetics of the reattached tooth reinforcement with fiber post is advised. Debonding failures occur when rapid loading is applied. The patient should be advised not to apply direct load on the reattached tooth. The bonding interface is often susceptible to the effects of cyclic fatigue and hydrolytic degradation over a period. Studies have described functional and esthetic success exceeding 7 years. The reattached teeth may have to be reinforced with full coverage ceramic restorations once the patient has completed his growth spurt. To conclude reattachment of fractured segment in the anterior teeth not only restores the tooth esthetically but also psychological motivation of both the parent and the child is achieved.

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Reis A, Loguercio AD. Tooth fragment reattachment: current treatment concepts. *Pract Periodontics Aesthet Dent*. 2004;16:739–740.
2. Andreasen JO, Andreasen FM. *Textbook and Color Atlas of Traumatic Injuries to the Teeth*. Copenhagen: Munksgaard Publishers; 1993.
3. 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;13:13–19.
4. Wood EB, Freer TJ. A survey of dental and oral trauma in South East Queensland during 1998. *Aust Dent J*. 2002;47:142–146.
5. Andreasen JO, Ravn JJ. Epidemiology of traumatic dental injuries to primary and permanent teeth in a Danish population sample. *Int J Oral Surg*. 1972;1:235–239.
6. Petti S, Tarsitani G. Traumatic injuries to anterior teeth in Italian school children: prevalence and risk factors. *Endod Dent Traumatol*. 1996;12:294–297.
7. Eden E, Yanar SC, Sonmez S. Reattachment of subgingivally fractured central incisor with an open apex. *Dent Traumatol*. 2007;23:184–189.
8. Tennery NT. The fractured tooth reunited using the acid etch bonding technique. *Tex Dent J*. 1988;96:16–17.
9. Baratieri LN, Monteiro S. Tooth fragment reattachment: case reports. *Quintessence Int*. 1990;21:261–270.
10. Arhun N, Ungr M. Reattachment of a fractured tooth: a case report. *Dent Traumatol*. 2007;23:322–326.
11. Reis A, Francci C, Loguercio AD, Carrilho MR, Rodriguez Filho LE. Reattachment of anterior teeth: fracture strength using different techniques. *Oper Dent*. 2001;26:287–294.
12. Pusman E, Cehreli ZC, Altay N, Unver B, Saracbası O, Ozgun G. Fracture resistance of tooth fragment reattachment: effects of different preparation techniques and adhesive materials. *Dent Traumatol*. 2010;26:9–15.
13. Badami AA, Dunne SM, Scheer B. An in vitro investigation into the shear bond strengths of two dentin bonding agents used in the reattachment of incisal edge fragments. *Endod Dent Traumatol*. 1995;11:129–135.
14. Dernarco FF, Fay RM, Pinzon LM, Powers JM. Fracture resistance of reattached coronal fragments- influence of different of adhesive materials and bevel preparation. *Dent Traumatol*. 2004;20:157–163.
15. Simonsen RJ. Traumatic fracture restorations: an alternative use of the acid etch technique. *Quintessence Int*. 1979;10(2):15–22.
16. Vijayakumaran V. Evaluation of crown restoration of fractured anterior teeth using original tooth fragment. *J Dent Res*. 1998;77:696.
17. Hayashi M, Takahashi Y, Imazato S, Ebisu S. Fracture resistance of pulpless teeth restored with post-cores and crowns. *Dent Mater*. 2006;22:477–485.
18. Deutsch AS, Cavallieri J, Musikant BL, Silverstein L, Lepley J, Petroni G. Root fracture and designs of prefabricated posts. *J Prosthet Dent*. 1985;53:637–640.
19. Bex RT, Parker MW, Judkins JT. Effect of dentinal bonded resin post-core preparations on resistance to vertical root fracture. *J Prosthet Dent*. 1992;67:768–772.
20. Thejokrishna P, Prabhakar AR, Kurthukoti AJ. Reattachment of embedded tooth fragment: a case report. *Ann Essenc Dent*. 2010;2(3):77–81.