

Reattachment of Fractured Anterior Tooth: A 2-Year Review of a Case

¹Ajayi Deborah Mojirade, ¹Abiodun-Solanke IM Funmilayo, ²Gbadebo Shakeerah Olaide

¹Lecturer and Consultant, Department of Restorative Dentistry, Faculty of Dentistry, College of Medicine/ University College Hospital, Ibadan, Nigeria

²Senior Registrar, Department of Restorative Dentistry, University College Hospital, Ibadan, Nigeria

Correspondence: Ajayi Deborah Mojirade, Lecturer and Consultant, Department of Restorative Dentistry, Faculty of Dentistry College of Medicine/University College Hospital, Ibadan, Nigeria, e-mail: md_ajayi@yahoo.com

ABSTRACT

Injury to anterior teeth is a relatively common occurrence. Dentists are confronted on regular basis with dental trauma and the management. Some clinical studies have reported reattachment of fractured tooth segment using adhesive resin cement and dentine bonding agent with or without intraradicular postplacement. Reattachment of tooth fragment is simple and can provide good functional and esthetic success.

Case description: This article reports the reattachment of a fractured anterior tooth in a 17-year-old male patient with adhesive resin and a prefabricated metallic post.

Result: Evaluation at 2 years revealed good reattachment, intact post, good esthetics (even after a repeat reattachment) and good periodontal health.

Keywords: Fracture, Anterior teeth, Adhesive resin.

INTRODUCTION

Coronal fracture of the anterior teeth is a common form of dental trauma that mainly affects children and adolescents. The majority of dental injuries involve the anterior teeth, especially the maxillary incisors,¹⁻¹⁵ for which an esthetically acceptable treatment is often required.

There are various options for treating fractured anterior teeth. These include restoration of fractured segment with composite resin, laminate veneers and postretained crown restoration after endodontic treatment. The choice of an option however, depends on pattern of fracture, restorability of fractured tooth (any associated root fracture), the relationship of the fracture to the alveolar crest (if the biological width is not violated), degree of pulpal involvement, level of eruption, apex formation, associated soft tissue injuries, presence/absence of fractured tooth fragment and its condition for use (fit between fragment and the remaining tooth structure), occlusion and esthetic requirement of the patient and also finances.^{2,3}

Reattachment of the fractured segment if available is a treatment option that has been severally reported in the literatures.¹⁻²⁴ These previous works have identified the advantages of this method of management to include the possibility of obtaining esthetic in a single appointment, obtaining healthy periodontal attachment, maintaining the original tooth contours and translucence, and ability to provide good and long-lasting esthetics (because the tooth's original form, color and surface texture are maintained). It can also restore function, result in a positive psychological response, and it's a reasonably simple procedure. In addition, tooth fragment reattachment allows restoration of the tooth with

minimal sacrifice of the remaining tooth structure. Furthermore, this technique is less time-consuming and provides more predictable long-term wear than when composite resin is used.

Clinical trials and long-term follow-up have reported that reattachment using modern dentine bonding agents or adhesive luting systems may achieve functional and esthetic success.^{18,19,21}

The present case report presents the reattachment of a fractured coronal tooth fragment using a prefabricated metallic post.

CASE REPORT

A 17-year-old male patient was referred to the conservation unit of the Department of Restorative Dentistry, University College Hospital, from Oral Diagnosis Clinic of the same hospital with complicated fracture of the right central incisor after a fall the previous night. There was an associated soft tissue injury with slight bruise of the right side of upper lip.

Medical History

Medical history was not contributory. Clinical examination (Figs 1A to C) revealed a horizontal fracture at the coronal two-third of the right central incisor labially and running obliquely on the palatal surface, with line of fracture placed about 1 mm subgingivally, involving enamel, dentine and the pulp. The fractured segment however was still attached but mobile.

Radiographic examination (Fig. 2) showed a horizontal fracture with pulpal involvement. No periapical pathology, apex was fused, no periodontal bone loss and no root fracture.



Fig. 1A: Tooth 11 with complicated crown fracture



Fig. 2: Tooth with parapost placed after post space preparation



Fig. 1B: Periapical radiograph of tooth



Fig. 1C: The fractured tooth fragment

Treatment option of possible reattachment of fractured tooth segment (postretained) after endodontic treatment or possible postretained crown was explained to the patient. After explaining the advantages, disadvantages, cost implication and prognosis of each treatment option, the parent and patient chose to have reattachment of the fractured tooth done.

The mobile fractured segment was removed and kept in normal saline. The tooth was isolated with rubber dam, a single visit root canal treatment was performed using the standard

step back technique for biomechanical preparation, and canal obturated with gutta percha plus AH 26 sealant (DeTrey Dentsply) employing cold lateral condensation technique. The fractured segment was attached temporarily with luting glass ionomer cement for the endodontic treatment to be reviewed in two weeks.

After 2 weeks, the tooth was reviewed and showed no symptom both clinically and radiographically. The temporarily attached tooth was removed and kept in normal saline. Gutta percha was removed, using peeso reamer and canal refinement done with a size three parapost drill. About 4 mm of gutta percha was left apically to maintain the apical seal. A size 3 parapost (parapost XP Coltene/Whaledent Incorporation, USA) was cemented in place with zinc phosphate (Figs 1A to C). Post-hole was also prepared in the pulp chamber of the fractured segment.

Both fractured segment and the remaining tooth enamel and dentine were acid etched, for 30 seconds, with a 37% phosphoric acid gel, rinsed copiously with water, and air dried with gentle stream of air from air jet making sure there was no desiccation. The etched surfaces were coated with an ethanol-based adhesive system: IntegraBond (Premier Dental Products Co, Canada), and cured for 10 seconds.

The fractured segment was reattached (after ensuring that the tooth was well positioned and in good contact) with light-cured resin composite applied on the surface of fractured segment. Occlusion was checked, excess composite removed with carver after which the composite was cured for 40 seconds both on the labial and palatal aspects, while segment was kept in position under pressure. Tooth was polished afterwards with ultrafine diamond bur (Fig. 3).

Occlusion was rechecked with articulating paper and showed no occlusal interference. Patient was instructed to avoid loading the anterior teeth. Immediate postoperative clinical assessment showed good esthetics, good occlusion, while radiograph showed stable reattachment (Fig. 4).

Tooth was reviewed at 1 month and 3 months but the patient defaulted only to come back 2 years after, complaining that the reattached tooth came off 3 days before presentation (while eating).



Fig. 3: Tooth after the reattachment, showing good esthetics



Fig. 5: Tooth at presentation after 2 years with post intact



Fig. 4: Radiograph showing tooth after paraposit retained reattached fractured segment



Fig. 6: Tooth after second reattachment, with slight change in shade of the fractured fragment indicating dehydration

Examination however, revealed that tooth and post were still intact (Fig. 5). The fractured segment was also available and intact. Radiographically post was intact and there was no periapical or periodontal pathology.

The tooth was reattached again following the previous procedure. Clinically, the segment however showed some color change due to dehydration because patient did not preserve it in a moist environment (Fig. 6). At 1 month review however, the tooth had regained its shade, translucency and hue back following rehydration by saliva (Fig. 7).

DISCUSSION

Trauma with accompanying fracture of anterior teeth is a tragic experience for the young patient and requires immediate attention, not only because of damage to the dentition but also psychological effect of the trauma to the child and his parents. It has however, been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure.⁴

Functional, esthetic, and biologic restoration of the fractured incisor often present a daunting clinical challenge.⁵



Fig. 7: Tooth after 1 month of second reattachment with change in the shade of the attached fractured segment indicating rehydration

Conventional composite resin restoration may result in less than ideal contours, color match and incisal translucency. Prosthodontic restoration in younger patients may have confounding variables such as large pulp, progressive eruption and gingival margin instability.⁵ Thus, when an intact fragment

is available, tooth reattachment may offer an immediate, most functional and esthetic treatment. The technique used in the presented case is reasonably simple, conservative and cost effective.

The first reported case of reattachment was by Chosack and Eildeman (two Hebrew paedodontists) in 1964, where they made use of cast post to support the reattachment of a fractured tooth.^{5,9} Tenerry was reported⁴ to be the first to use acid-etch technique for reattachment of fractured tooth in 1988. There have since been several other documented cases of reattachment following improvement in adhesive dentistry.^{3,7,8,16}

In case of pulpal involvement, there may be need to use post after endodontic treatment to provide mechanical support for the fractured segment. The use of custom cast post,^{2,5,9} as well as prefabricated post^{3,7,10,20,22,24} like in this reported case, have been documented with the latter eliminating laboratory stage of postfabrication, and thus, making the procedure faster. The post will interlock the two fragments, minimizing stress on the tooth structure that is reattached.

Reattachment has been improved on over time with many modifications like use of bevel designs, chamfers, dentinal and enamel grooves, and choices of resin composite material and techniques for the reattachment of tooth fragments.¹

All restorative techniques however, present limitations and reattachment is not an exception. The first limitation is that the longevity of this procedure is not predictable, and the fragment may detach from the remaining tooth tissue.¹¹ The attachment of the fragment in an adequate position may be difficult depending on the characteristics of the fracture and fragment. In cases of nonvital tooth like the present case, esthetics may become an important issue as pulpless teeth lose part of their translucency and brightness overtime.¹ Also, dehydrated fragments may not retain the original hue and translucency, resulting in a poor esthetics as observed in this reported case when the tooth was reattached again secondary to failure after 2 years of first reattachment (Fig. 5). The bonding line between the remaining tooth and the fragment may also present a different shade.¹¹

The fragment however, if dehydrated will rehydrate once it is placed in the oral cavity.⁸ The shorter the time span between the trauma and treatment the lesser the dehydration and the faster the fragment will regain its original color, translucency and hue.⁸ This was also observed in the present case when patient presented again 1 month after the second reattachment for review (Fig. 6). However, to avoid dehydration of the fractured segment during endodontics and post space preparation, the fragment can be stored in normal saline,^{13,20} as was done in this present case during the post space preparation stage.

Another advantage of the technique is that all the other alternative methods like direct adhesive composite reconstruction, veneers and crowns can still be performed in case of failure.^{12,13}

Bonding the original tooth fragment is however not limited to the anterior region. Posterior teeth fractures, especially in

the case of premolars, can also be successfully bonded together and the long-term survival of such repairs has been reported to be in the 5-year range. However, in these cases, the bonded teeth are best viewed as a temporary restoration awaiting partial or full crown coverage.¹⁴

CONCLUSION

The presented case has demonstrated that conservative approach to restoration of fractured teeth using reattachment is a viable, inexpensive, efficient and feasible alternative that can restore the esthetic and function of fractured teeth almost immediately with very positive psychological effect.

However, long-term prognosis of the fractured segment may be queried and may thus require other restorative alternatives like veneering and crown fabrication in case of failure.

REFERENCES

1. Macedo GV, Diaz PI, Fernandes CA, Ritter AV. Reattachment of anterior teeth fragments: A conservative approach. *J Esthet Restor Dent* 2008;20:5-20.
2. Kavitha T, Rao CVN, Lakshmi NL. Reattachment of fractured tooth fragments using a custom fabricated dowel—three case reports. *Endodontol* 2000;12:65-70.
3. Adanir N, Ok E, Erdek Y. Reattachment of subgingivally oblique fractured central incisor using a fiber post. *Eur J Dent* 2008;2:138-41.
4. Hegde RJ. Tooth fragment reattachment—an esthetic alternative: Report of a case. *J Indian Soc Pedod Prev Dent* 2003;21(3): 117-19.
5. Murchison DF, Burke FJT, Worthington RB. Incisal edge reattachment: Indications for use and clinical technique. *Br Dent J* 1999;186(12):26 614-19.
6. Basavaprabhu A, Sadanand K, Shantanu C, Sudesh K. Fractured maxillary central incisor restoration with fragment reattachment: A 2-year follow-up case report. *J Oral Health Comm Dent* 2010;4(1)22-25.
7. Saha SG, Saha MK. Management of a fractured tooth by fragment reattachment. A case report. *Int J Dent Clinics* 2 (2) (Abstract) (2010).
8. Anupama Patil. Anterior tooth fragment reattachment. www.bite.in.com downloaded on 2/6/2011.
9. 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.
10. Zorb YO. Reattachment of coronal fragment using fiber reinforced post. *Eur J Dent* 2007;1:174-78.
11. Alonso RCB, Papa ANC, Casteleti MGSC, Sacramento PA, Puppini-Rontani RM. Reattachment of an autogenous tooth fragment—36-month follow-up: Fast and safe rehabilitation of fractured teeth. *Perspect Oral Sci* 2009;1(2):37-42.
12. Belcheva A. Reattachment of fractured permanent incisors in school children (review). *Journal of IMAB—Annual Proceeding (Scientific Papers) Book* 2008;2:96-99.
13. Ojeda-Gutierrez F, Martinez-Marquez B, Rosales-Ibanez R, Pozos-Guillen AJ. Reattachment of anterior teeth fragments using a modified Simonsen's technique after dental trauma: Report of a case. *Dent Traumatol* 2011;27:81-85.

14. Chan DCN, Myers ML, Barrack GM, Goldstein RE. Chipped, fractured, or endodontically treated teeth. www.scribde.com downloaded on 5/6/2011.
15. Reis A, Loguercio AD, Kraul A, Matson E. Reattachment of fractured teeth: A review of literature regarding techniques and materials. *Oper Dent* 2004;29(2):226-33.
16. Simonsen RJ. Restoration of a fractured central incisor using original tooth fragment. *J Am Dent Assoc* 1982;105(4):646-48.
17. Kalra N, Rai P. Biological aspects of tooth fragment reattachment in immature incisors. *J Indian Soc Pedod Prev Dent* 2005;23(1):42-43.
18. Andreasen FM, Noren JG, Andreasen JO. Long-term survival of fragment bonding in the treatment of fractured crowns. *Quintessence Int* 1995;26:669-81.
19. Oz IA, Haytac MC, Toroglu MS. Multidisciplinary approach to the rehabilitation of a crown-root fracture with original fragment for immedia esthetics: A case report with 4-year follow-up. *Dent Traumatol* 2006;22(1):48-52.
20. Badami V, Kranthikumar S. Treatment of complicated crown-root fracture in a single visit by means of rebonding. *J Am Dent Assoc* 2011;142(6):646-50.
21. Ferraz JAB, Pécora JD, Saquy PC, Sousa-Neto MD. Treatment of oblique crown fractures in maxillary premolars using adhesive tooth fragment reattachment: 19 years of follow-up. *Dental Traumatology*. doi: 10.1111/j.1600-9657.2011.01014.x. Cited from www.onlinelibrary.wiley.com on 21/7/2011.
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. Shah N, Mandlik J, Pawar K. Reattachment techniques: Few case reports. *J Int Clin Dent Res Organ* 2009;1:62-69.
24. Gautam S. Conservative management of complicated tooth fracture. *J Nepal Dent Assoc* 2010;11(1):49-55.