

CASE REPORT

Reattachment of coronal tooth fragments: Aesthetic management of a complicated anterior maxillary crown fracture

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The trauma of anterior teeth is a frequent occurrence in young patients. Reattachment of fractured fragments is one of the various treatment modalities proposed in anterior tooth coronal fractures. The reattachment of fractured fragments grants the advantage of immediate aesthetic rehabilitation and restoration of function, which is a relatively rapid and less arduous procedure. The manuscript presents a case report depicting the management of a complicated crown root fracture of anterior maxillary teeth first treated endodontically, followed by reattachment of the same fragment with a cast post-reinforcement. Reattachment of fractured coronal tooth fragments is a feasible restorative option, rapidly restoring the function and aesthetics of the tooth by a conservative and inexpensive approach.

Keywords: tooth fractures, endodontics, trauma, incisors, esthetics

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Introduction

The most prevalent consequences of traumatic injuries are coronal fractures in the permanent dentition, primarily seen in the anterior maxillary teeth. Literature advocates that coronal fractures of the anterior teeth are seen in one-fourth of the population in the young age group, mainly accredited to falls, high-impact sports injuries, and automobile accidents [1,2]. Of all coronal tooth fractures, the prevalence of trauma to maxillary central incisors accounts for nearly 37%, attributed to the anterior positioning and protrusion of the tooth due to the eruptive pattern during tooth morphogenesis [3]. Coronal fractures of the maxillary incisors usually present with an oblique fracture line labiolingually [4].

Traumatic injuries to the anterior maxillary teeth are commonly seen in clinical practice. Management of such coronal fractures is a challenge as several treatment modalities must be considered. Successful management strategies necessitate immediate functional and aesthetic repair, supported by endodontic treatment followed by a post-endodontic restoration, namely, access restorations, cast posts, fibre posts, veneering, and full coverage crowns when indicated. However, with the availability of the fractured tooth fragment and no or minimal violation of the biological width, reattachment of the dental fragment is one of the comprehensive options for managing coronal tooth fractures [5]. Reattachment of a fractured coronal tooth fragment yields long-lasting aesthetics as the tooth regains its anatomic form, colour, and surface texture. The procedure restores efficient function in addition to a definitive psychological response. Patient cooperation, understanding of

the benefits and limitations of this treatment modality and postoperative care are essential for a good prognosis [4,5].

Chosack and Eidelman reported the first case on reattachment of fractured maxillary incisor fragment managing a complicated tooth fracture with endodontic treatment followed by a post endodontic restoration of cast post and core [6]. The success of the reattachment procedure is based on specific factors such as the fracture site, size of remnants of fracture, fracture of the alveolar bone, fracture pattern, presence of root fracture, secondary trauma, soft tissue injuries, periodontal and pulpal involvement, the extent of the root formation, biological width invasion, occlusion, time-lapse and material used for reattachment, post-endodontic restoration and prognosis [7]. Reattachment is a treatment modality helping restore the natural shape, contour, translucency, surface texture, occlusal alignment, and colour of the tooth with a positive emotional and social response from the patient, preserving the natural tooth structure. It is also a conservative and economical procedure [8]. However, in case of significant periodontal damage or biological width invasion, the management of coronal fractures should follow the protocol concerning the associated issues. The approach to coronal tooth fractures must be systematic to achieve a successful result [6].

The article presents a case of a complicated maxillary anterior coronal fracture treated with endodontic treatment and reattachment of the fractured segment with a cast post and core as a post endodontic restoration to provide additional support for the restoration's success and longevity.

Case presentation

A 23-year-old male patient reported the chief complaint of broken upper front teeth following trauma a day prior due

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to a fall from a bike (Figure 1). Intraoral clinical examination revealed a horizontal fracture involving enamel and dentin with exposure of the pulp, i.e. Ellis Class III fracture extending obliquely from the incisal edge to the middle-third region of 11 and 12; the left maxillary central and lateral incisor. The fractured fragment was loosely attached to the tooth. Soft tissue examination revealed minimal laceration of the upper lip. Also, an Ellis Class II fracture was seen on the 21 right maxillary central incisor. Radiographic examination confirmed the presence of horizontal tooth fracture in 11, 12 (Figure 2). The orthopantomogram also confirmed the presence of the horizontal fractures in 11, 12 with the absence of any other traumatic injuries (Figure 3). The patient reported harmonious functional dental status prior to the trauma, without any dysfunctions or parafunctions affecting the positions of the maxillary incisors. The patient was given a detailed explanation of the different treatment modalities, including reattachment, which included the first removal of the fractured fragment, secondly performing endodontic treatment of the tooth, reattachment of the tooth crown fragment using a cast post and finally the long term monitoring associated with the treatment option. The patient was also briefed about the risks of failure associated such as dental hygiene practices and restriction on sports activities. On understanding the benefits and limitations of treatment, the patient communicated their inclination to maintain the integrity of the tooth in its original form. Written informed consent was obtained from the patient.

Under aseptic conditions, local anaesthesia was administered with anterior infiltration and nasopalatine nerve block techniques with 2% lidocaine containing 1:100,000 epinephrine. The fractured segment was separated from the tooth and stored in a physiological saline solution to preserve it from dehydration and discolouration of the tooth fragment. The fracture site was examined in detail, disinfected and cauterised with a diode laser using a high power 908 nm diode laser (Kavo Gentle Ray) with a 200 µm fiberoptic tip and set at a power of 2.5 W and evaluated for the fit of the broken fragment (Figure 4). Following access cavity preparation with an Endoaccess bur #q (Dentsply Maillefer, Switzerland), working length was determined with an apex locator (RootZX II, J.Morita, USA). The root canal system was cleaned and shaped using #15 size K files initially followed by rotary instrumentation with ProTaper files (Dentsply Maillefer, Ballaigues, Switzerland) up to size F2. Disinfection of the root canal system was achieved by initially flushing with 3% sodium hypochlorite (Pyrex, Prime dental products, Mumbai, India), 17% EDTA solution (Dent Wash, Prime Dental Products, Mumbai), normal saline and a final rinse with 2% Chlorhexidine solution. The root canal was dried with paper points and obturated with corresponding F2 gutta-percha cones with calcium hydroxide-based sealer (Sealapex, SybronEndo, Orange, CA, USA) with a down pack using heated plug-gers (System B, SybronEndo, Orange, CA, USA).

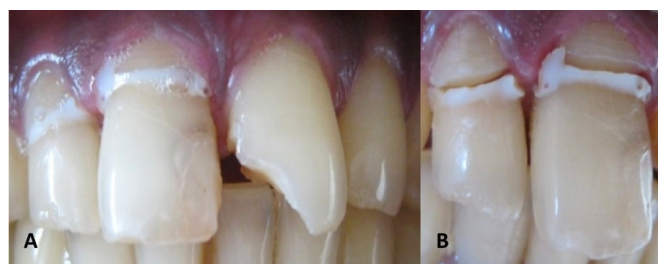


Fig 1. A. Pre-operative photograph. B. Close-up view.

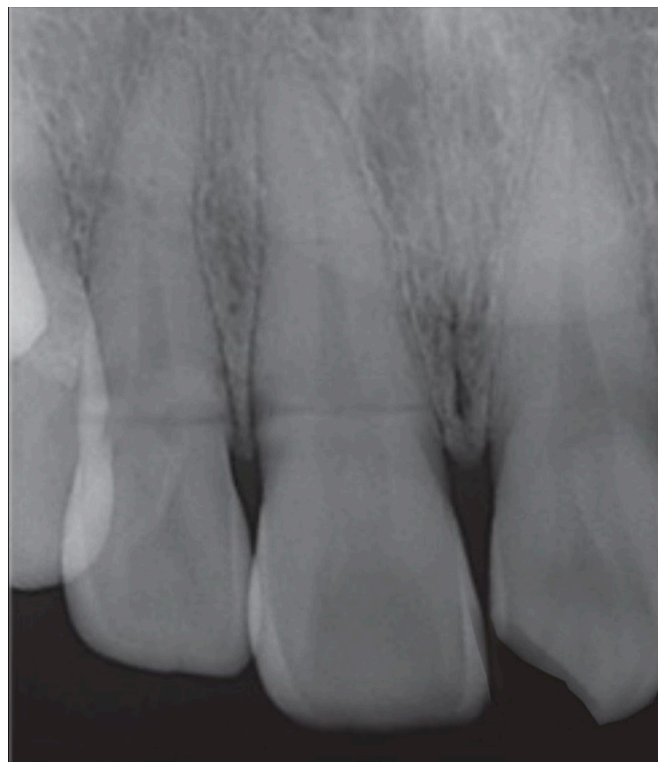


Fig. 2. Radiographic evaluation of the fractured site depicting horizontal fracture lines in 11,12.



Fig. 3. OPG depicting the horizontal fracture lines in 11,12



Fig. 4. Fragment removal and crown lengthening (LASER)

Following completion of the endodontic therapy, the root canal system was prepared to receive the cast post by removal of gutta-percha from the coronal two-thirds of the canal with peeso-reamers (drill size 2). Subsequently, bevels were placed on the tooth and on the fractured tooth fragment for enhanced retention. A wax pattern was prepared in the canal with the help of Inlay Wax (Figure 5). The cast post was fabricated using a type II Gold alloy followed by a try-in the root canal and adjusted to the required length (Figure 6). Accordingly, minimal adjustments were made



Fig. 5. Post Wax pattern preparation.



Fig. 6. Cast post core - fragment Trial.



Fig. 7. Luting of the Post and core

in the fractured crown fragments' pulp chamber to receive the post's coronal portion. Once the adjustments were confirmed, the alignment of the coronal tooth fragments was verified with the post in situ. Following isolation with liquid dam (Vistaapex), the post was luted in the canals using dual-cured resin luting cement (Ivoclar Vivadent) (Figure 7). The coronal fractured fragments were reattached (Figure 8). The teeth were finished and polished with polishing discs (Sofflex discs, Shofu) (Figure 9). Anterior and posterior occlusion was verified, and postoperative instructions were given to the patient to prevent functional loading in the anterior teeth. The patient was recalled for follow-up after a month, and then a year, the tooth was observed to be in normal form, function and aesthetics.

Conclusion

The case report presents the management of complicated crown-root fractures by a comprehensive multidisciplinary approach, thereby preserving the natural anatomy of tooth structure. Reattachment procedures provide a conservative, inexpensive, and aesthetic result depending on frag-

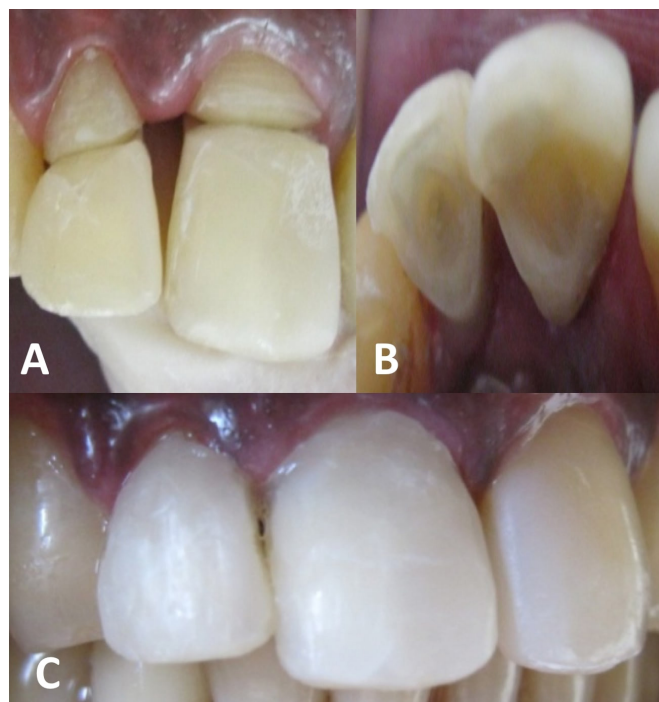


Fig. 8. A. Fragment reattached. B. Palatal View. C. Frontal View.



Fig. 9. Postoperative photograph.

ment availability. Nonetheless, relief from pain and immediate restoration of aesthetics and functions accomplishes the treatment goal in trauma.

Authors' contribution

PS: Conceptualization; Data curation; Formal Analysis; Writing – review & editing.

RB: Supervision; Validation; Visualization; Writing – original draft.

AK: Investigation; Supervision; Writing – review & editing.

Conflict of interest

None to declare.

References

- Andreasen JO, Andreasen FM. Classification, etiology and epidemiology, in Textbook and Color Atlas of Traumatic Injuries to the Teeth: Mosby, Munksgard, Copenhagen, Denmark, 1994:151–179.
- Andreasen FM, Andreasen JO. Luxation injuries of permanent teeth: General findings, In: Andreasen JO, Andreasen FM, Andersson L, editor. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 4th ed. Oxford, UK: Blackwell Munksgaard; 2007:372-403.
- 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.
- Mojirade AD, Funmilayo A-SIM, Olaide GS. Reattachment of fractured anterior tooth: a 2-year review of a case. Int J Prosthodont Restorat Dent. 2011;1(2):123–127.
- Macedo GV, Diaz PI, De O Fernandes CA, Ritter AV. Reattachment of anterior teeth fragments: a conservative approach. J Esthet Restor Dent. 2008;20(1):5-18; 19-20.
- Chosack A, Eidelman E. Rehabilitation of a fractured incisor using the patient's natural crown. Case report. Journal of Dentistry for Children. 1964;31:19–21.
- Wadhvani CPK. A single visit, multidisciplinary approach to the management of traumatic tooth crown fracture. British Dental Journal. 2000; 188(11):593–598.
- Baratieri LN, Júnior SM, Cardoso AC, and Filho JCD. Coronal fracture with invasion of the biologic width: a case report. Quintessence International. 1993;24(2):85–91.
- Deliperi S, Bardwell DN, Congiu MD. A clinical challenge: Reconstruction of severely damaged endo/bleached teeth using a microhybrid composite resin. Two year case report. Pract Proced Aesthet Dent. 2003;15:221–226
- Caliskan MK, Turkun M, Gomei M. Surgical extrusion of crown-root-fractured teeth: a clinical review. Int Endod J. 1999;32:146–151.
- Johnson RH. Lengthening clinical crowns. J Am Dent Assoc. 1990;121:473–476.
- Kocadereli I, Tasman F, Güner SB. Combined endodontic-orthodontic and prosthodontic treatment of fractured teeth. Case report. Aust Dent J. 1998;43:28–31.
- 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.
- Christensen GJ. When to use fillers, build-ups or posts and cores. J Am Dent Assoc. 1996;127:1397–1398.
- Christensen GJ. Posts: necessary or unnecessary? J Am Dent Assoc. 1996;127:1522–1524.
- Rajput A, Ataide I, Fernandes M. Uncomplicated crown fracture, complicated crown-root fracture, and horizontal root fracture simultaneously treated in a patient during emergency visit: a case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009 Feb;107(2):e48-52.