International Journal of Applied Dental Sciences 2023; 9(2): 534-537

ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2023; 9(2): 534-537

www.oraljournal.com
Received: 25-03-2023
Accepted: 28-04-2023

Dr. Abhilash Gogoi
PG 3rd Year, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Dr. Mousumi Goswami
Head and Professor, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Dr. Aditya Saxena
Professor, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Dr. Supriya Bhatara
PG 2nd Year, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Dr. Shivangani
PG 3rd Year, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Dr. Shumayla Khan
PG 3rd Year, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Corresponding Author:
Dr. Abhilash Gogoi
PG 3rd Year, Department of Pediatric and Preventive Dentistry, Greater Noida, Uttar Pradesh, India

Tooth fragment reattachment: A case series and literature review of a biological restoration for traumatic dental injuries

Dr. Abhilash Gogoi, Dr. Mousumi Goswami, Dr. Aditya Saxena, Dr. Supriya Bhatara, Dr. Shivangani and Dr. Shumayla Khan

DOI: https://doi.org/10.22271/oral.2023.v9.i2g.1770

Abstract
Dental trauma is very common in children and relatively young people, with the line of treatment depending on the time elapsed, age of the child, and tooth maturity. A traumatised anterior tooth requires immediate clinical attention and if left untreated, it can cause damage to the entire dentition and even have a psychological impact on the patient. Management of complicated crown fractures is a multifactorial process that depends on the extent and pattern of fracture, restorability of a fractured tooth, secondary injuries, presence/absence of fractured tooth fragment and its condition for use, occlusion, esthetics, finances, and prognosis. If the fractured segment is available and there is close approximation of the segment to the remaining tooth, reattachment of the fractured segment is a feasible option. In the present case series, complicated crown fractures were managed appropriately followed by tooth fragment reattachment. On follow up examinations, the teeth remained normal in esthetics and function indicating clinical success of the treatment. Thus, appropriate management of anterior tooth fracture not only restores the function and esthetics but also provides a positive psychological impact for the patient.

Keywords: Dental trauma, tooth fragment reattachment, hydration, tooth preparation

Introduction
Traumatic Dental Injuries (TDIs) are frequently seen in children and young adults, comprising 5% of all injuries. TDIs in children in the 5-12 years age group show a high prevalence, with at least 20% - 30% of 12- year-old children experiencing TDIs at least once, with the typical injury being an uncomplicated crown fracture [1]. According to a recent systematic review, the prevalence of TDIs in India range from 1% to 76%, with the maxillary anterior being the most common region. The prevalence of TDIs was found to be 12% for age groups > 6 years [2].
With TDIs so commonly encountered in this age group, their appropriate management becomes a paramount duty of care providers to ensure minimal long-term complications to the young permanent teeth, such as premature loss of teeth, guarded prognosis, ankylosis, loss of function and compromised alveolar growth and esthetics. Conventional treatment modalities like RCT, implants, and Zirconia crowns for the management of anterior tooth trauma are often impractical and deterred in children due to their impending growth and large pulp chambers risking the loss of pulp vitality [3].
One of the ways to manage coronal tooth fractures in cases where there is minimal or no damage to the surrounding periodontium and intact fractured fragment is to reattach the tooth fragment. Reattaching the fragment to the fractured tooth is a conservative approach to achieve optimum aesthetics as the tooth's original shape, colour, and texture are preserved, eliciting a positive psychological response [4]. Various studies (cite) have presented evidence of predictable long-term results of fragment reattachment compared to using a direct composite material.
The advent of adhesive dentistry and advancements in restorative materials, placement techniques, preparation designs, and adhesive protocols have enabled clinicians to perform fragment reattachment reliably and in a more predictable manner.

Thus, this article presents a clinical observation of three cases of fragment reattachment secondary to a TDI with different retention techniques and adhesive protocols.

Case Series

The following Case Series, prepared per the CARE Guidelines (Supporting material 1), is a clinical observation of children presenting to the Department of Paediatric and Preventive Dentistry, ITS Dental College, Hospital and Research Centre, Greater Noida, between 2020-2023. All the patients consented to the treatment rendered.

Case 1

A twelve-year-old boy reported with a chief complaint of broken upper teeth after experiencing a TDI upon fall from a cycle a day ago. The parents reported finding the fragments of two teeth immediately and preserving them in cold milk since the time of injury (Dry time = 20 Minutes). He was in acute pain. Patient's medical history was non-relevant. Clinical and radiographic examination revealed horizontal fractures, Ellis Class I in 11 and Ellis Class III in 21 and 22 (Figure 1). The electric pulp testing revealed a responsive 11 and 21 and a non-responsive 22. No mobility of the teeth was recorded, and surrounding intraoral soft tissues were normal. The fractured fragments wrt 21 and 22 were isolated and washed thoroughly under running water and stored in sterile normal saline to prevent dehydration. Partial pulpotomy was done after an operative diagnosis wrt 21 with MTA. GIC type II was placed over it after 15 minutes. Root canal treatment was carried out, and obturation was completed in 22, followed by post and core in the subsequent visit. Retention grooves were prepared on the labial aspect of 21 and 22 after creating an infinite bevel throughout the fractured margin. Retentive tags were. Created on the palatal aspect of the fractured tooth fragments of 21 and 22. They were then adjusted, and the fit was examined. The tooth surfaces were etched with 37% Phosphoric acid for 30 seconds, and the fragments were etched for 15 seconds. The fragments were then rinsed and blot-dried with paper points, followed by the application of a bonding agent on both the tooth surfaces and the fragments. The bonding agent was not cured, and a dual cure composite was applied to the inner fragment and tooth surface, secured in position, and cured. The fracture line was masked with composite resin and polished (Figure 2).

Fig 1: Pre-Operative Presentation; A: Right buccal view; B: Left Buccal view; C: Maxillary Occlusal view; D: Fractured tooth fragments wrt 21 22; E: Pre-Operative Radiograph wrt 21 22

Fig 2: Post-Operative Presentation; A: Post-Operative IOPA after MTA Pulpotomy wrt 21; B: RCT wrt 22; C: Post Insertion wrt 22; D: IOPA after Post cementation; E. Retention grooves wrt 21 22; F: Retention groves wrt tooth fragments; G: Post-Operative Buccal View

Case 2

A thirteen-year-old boy reported with the chief concern of a fractured front upper tooth upon falling during playing two days ago. Parents reported finding the fragment of only one tooth immediately and storing it in paper for 2-3 hours, followed by storage in milk (Dry time =3- 4 hours). Clinical and radiographic examination revealed Ellis Class II fracture in 11 and 22, Ellis Class III in 21 (Figure 3). The electric pulp testing revealed a positive response in 11 and 22 and no response wrt 21. No mobility of the teeth was recorded, and surrounding intraoral soft tissues were normal. The fractured fragment wrt 21 was isolated, washed thoroughly under running water, and stored in sterile normal saline. A fractured incisal edge was observed wrt to the fragment. Root canal treatment was carried out with obturation in 21 in the same sitting. Bevelling on the labial and palatal aspect of the fractured tooth fragment was done with a slow-speed handpiece. The fragment was then held with an applicator tip supported by bee wax and approximated on the tooth. The same etching and bonding protocols were followed. A flow able composite resin (Ivoclar Vivadent), after proper shade matching, was used for luting the fragment to 21. The composite build-up of the fractured incisal edge and the fracture line was done wrt 21, in addition to the composite restorations wrt 11 and 22. (Figure 4).

Fig 3: Pre-Operative Presentation; A: Pre-Operative frontal view; B: Pre-Operative IOPA; C: Approximation of fragment wrt 21; D: Rehydrated Fragment wrt 21

Fig 4: Post-Operative Presentation; A: Post-Operative IOPA wrt 21 - RCT; B: Retention grooves in the fragment wrt 21; C: Post-Operative Frontal view

Discussion

Tooth fragment reattachment is an aesthetic and functional treatment modality for fractured teeth that involves the fractured tooth's autogenous bonding. This conservative approach ensures original anatomy, translucency, and incisal wear at the same rate as the original tooth. Increasing developments and advancements in technique protocols, adhesive systems and dental materials have paved the way for more predictable and reliable restorations. Another important consideration for successful outcomes is the rehydration of the fractured fragment.

Hydration of the tooth fragment helps maintain the original aesthetic appearance and prevents the desiccation of the collagen fibrils and network. A dehydrated fragment will exhibit decreased bond strength, fracture resistance and poor translucency [5]. A rehydrated fragment will also ensure better penetrability of the bonding agent, improving the bonding outcome by mechanical interlocking.

Therefore, one of the factors that play an important role in the success of fragment reattachment is the mode of storage of the fragment. A study by Farik *et al.* [6] observed a significant decrease in strength and fracture resistance when the dry time is more than one hour, highlighting the importance of keeping the fragment moist.

The several modifications in the tooth and fragment preparation to improve the bonding abilities have been studied extensively, and evidence suggests that tooth preparation techniques such as dentin grooves, over-contouring, chamfering, and beveling before reattachment can result in higher fracture resistance compared to simple bonding [7]. However, to minimise the technical complexity of the procedure and the duration of the treatment, several studies and case reports have simplified the process by eliminating any supplementary tooth preparation in traumatised teeth. In our clinical observation, the tooth and fragment preparation depended on individual cases after considering factors like unsupported enamel, presence of adequate tooth structure, microfractures along the fracture lines of the fragment and the tooth, dry time of the fragment and the extent of the fracture. A recent systematic review highlighted that simple reattachment is considered the preferred technique in case of complete fragment adaptation, instead of other reattachment techniques using over-contouring and dentinal groove preparation.

Various studies have been conducted to study the influence of the bonding system employed on the treatment outcome [4]. Reis *et al.* [8] concluded that fracture resistance depends on both the materials used and prior preparation, highlighting their equal importance. In contrast, Chazine *et al.* [9] and Bruschi *et al.* [10] reported that the outcome was independent of the selection of materials. Hence, there exists a lack of agreement in the literature demonstrating the absence of a defined protocol for reattaching a fractured tooth fragment.

We attempted to use a combination of techniques to customise the treatment approach as per the patient-related factors to obtain the best possible outcome. All the techniques have shown optimum results, and one of the key factors in our clinical observation was the importance of early reporting and the pre-treatment of the fragment before reattaching.

Conclusion

Tooth fragment reattachment has proven to be an effective treatment modality for traumatised anterior teeth, especially in young children, yielding optimum treatment outcomes with good aesthetics. For this purpose, schools and the community should be made aware of immediate management of traumatic dental injuries so they can be encouraged to store fractured fragments. Additionally, studies should be focused on establishing a defined protocol to produce predictable results.

References

1. Traumatic Dental Injuries: A Manual, Third Edition © J.O. Andreasen, L.K. Bakland, M.T. Flores, F.M. Andreasen and L. Andersson Published 2011 by Blackwell Publishing Ltd.
2. Tewari N, Mathur VP, Siddiqui I, Morankar R, Verma AR, Pandey RM. Prevalence of traumatic dental injuries in India: A systematic review and meta-analysis. Indian J Dent Res. 2020 Jul-Aug;31(4):601-614.
3. Agarwal N, Kumar D, Anand A, Bahetwar SK. Dental implants in children: A multidisciplinary perspective for long-term success. Natl J Maxillofac Surg. 2016 Jul-Dec;7(2):122-126. DOI: 10.4103/0975-5950.201362
4. Garcia FCP, Poubel DLN, Almeida JCF, Toledo IP, Poi WR, Guerra ENS, *et al*. Tooth fragment reattachment techniques-A systematic review. Dent Traumatol. 2018 Jun;34(3):135-143.
5. AlQhtani FA. Reattachment of a Dehydrated Tooth Fragment Using Retentive Holes. Cureus. 2020 Jan 13;12(1):e6640.
6. Farik B, Munksgaard EC, Andreasen JO, Kreiborg S. Drying and rewetting anterior crown fragments prior to bonding. Endod Dent Traumatol. 1999 Jun;15(3):133-116.
7. Nagi SM, Khadr SM. Influence of different tooth preparation and bonding techniques on the fracture resistance of tooth fragment reattachment. Biomater Investig Dent. 2021 Jul 20;8(1):112-118.
8. Reis A, Francci C, Loguercio AD, Carrilho MR, Rodriques Filho LE. Re-attachment of anterior fractured teeth: fracture strength using different techniques. Oper Dent. 2001;26:287-94.
9. Chazine M, Sedda M, Ounsi HF, Paragliola R, Ferrari M, Grandini S. Evaluation of the fracture resistance of reattached incisal frag-ments using different materials and techniques. Dent Traumatol. 2011;27:15-8.

10. Bruschi-Alonso RC, Alonso RCB, Correr GM, Alves MC, Lewgoy HR, Sinhoreti MAC, *et al*. Reattachment of anterior fractured teeth: effect of materials and techniques on impact strength. Dent Traumatol. 2010;26:315-22.

How to Cite This Article
Gogoi A, Goswami M, Saxena A, Bhatara S, Shivangani, Khan S. Tooth fragment reattachment: A case series and literature review of a biological restoration for traumatic dental injuries. International Journal of Applied Dental Sciences. 2023;9(2):534-537.