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Management of complicated and uncomplicated crown-root fractures: A case series

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Abstract

Crown fractures are the most common consequences of traumatic injuries that mainly occur in the anterior permanent dentition. The choice of the esthetic restorative treatment of fractured anterior teeth remains the biggest challenge for the dentist. These fractures can be located either supra-gingivally or sub-gingivally. The treatment of these fractures is also based upon the involvement of the pulpal tissue. This case series highlights two different techniques of tooth fragment re-attachment, depending on the extent of the fracture as well as involvement of the pulp.

Keywords: Fragment re-attachment, Supra-gingival, Sub-gingival, Traumatic injuries

Introduction

Traumatic injuries to the dentition are very common that involves both primary and permanent teeth with up to 14% of the population being affected by this. Several factors which could be attributed to its cause are accidents, falls, contact sports and frontal impact injuries [1, 2]. Common predilection of these injuries are seen prior to 18 years of age and in the maxillary anterior teeth region due to its arch position. Most traumatic injuries involve damage to enamel and dentin without pulpal involvement [3]. Such injuries compromise the esthetics and requires precise and skilful management for its rehabilitation as it poses an impact on the psycho-social wellbeing of the patient [4]. Traumatic injuries to the dentition can be classified as uncomplicated (enamel, dentin) which accounts for 25-40% and complicated (enamel, dentin and pulp) that involves 11-15% of the injuries [5]. Crown-root fractures account for only 0.3-5% of the injuries and demand a multidisciplinary approach for the management of the same [6]. In the case of fractures that involve invasion of the biologic width, restorations of the biological distance and access to the remnant's margins are required for the purpose of allowing for the correct isolation of the operatory field and determination of the fracture extent [7, 8]. A careful and integrated approach needs to be taken with proper diagnosis, clinical and radiographic examination and choosing the proper restorative approach aided with accessibility, isolation and magnification. A detailed clinical assessment would involve:

- Timing of the fracture
- Age of the patient
- Vitality of the tooth
- Root maturation
- Level of the fracture line
- Accessibility to the fracture site
- Presence/absence of vertical root fracture
- Correct restorative rehabilitation

The choice of esthetic rehabilitation of fractured anterior tooth poses a challenge to the clinician. Several treatment modalities are available including composite restorations, fragment reattachment, ceramic restorations. Fragment reattachment is a conservative and esthetic approach provided the fractured segment is available and in good condition [9].

This case series highlights the esthetic rehabilitation of both complicated and uncomplicated fractures of anterior teeth with a follow-up of 3 months each.

Case report 1

A 26-year-old patient presented with a chief complaint of a broken upper front tooth to the department of Conservative dentistry and Endodontics, Bapuji Dental College and Hospital, Davangere. Patient presented with a history of fall from bike 2 hours prior to reporting to dental clinic. The patient’s medical history was non-contributory. On a thorough clinical and radiographic examination, tooth number 11 had a crown fracture with pulpal involvement. There were no signs of periapical pathology and complete root formation was seen, upon which the diagnosis derived was complicated crown fracture. Further, it was noticed that the fragment was retained in place by palatal gingival tissue. Hence, an intrasulcular incision was given to aid in the removal of the fragment following which the fragment was stored in distilled water. It was noted that the fracture line was extending sub-gingivally. Based on the scenario, the following treatment plan formulated was:

- Endodontic treatment followed by post placement
- Reattachment of the fractured fragment after surgical flap reflection. A split dam isolation was done prior to initiation of endodontic treatment of 11. Copious irrigation was done using saline and povidone iodine to clean the operative field. After obturation, No2 Peaso reamer was used to prepare post manufacturer’s instructions. An intrasulcular incision was given and flap reflected to expose the margins of the affected tooth, which were present 1mm coronal to the crest of the bone. Bone filing was done and hemostasis was achieved by using a hemostatic styptic agent with cotton. Try-in of the fragment was done which showed excellent adaption to the margins. Both the fragment and tooth were etched with 37% phosphoric acid for 30 seconds followed by rinsing and drying for 5 seconds. Universal bonding agent (3M ESPE – ScotchBond Universal) was applied with an applicator tip and light cured for 10 seconds using an LED curing light (BG, Bluedent). A flowable composite resin was used to lute the fragment to the tooth and light cured for 20 seconds each from buccal and palatal aspects. Excess resin was removed following which finishing and polishing was done. An IOPAR was taken to conform the adequate approximation of the fragment and presence/absence of any excess composite resin. Following which, the flap was sutured back using interrupted sutures.



Fig 1b: Pre-operative photograph (palatal surface)



Fig 1c: Pre-operative radiograph

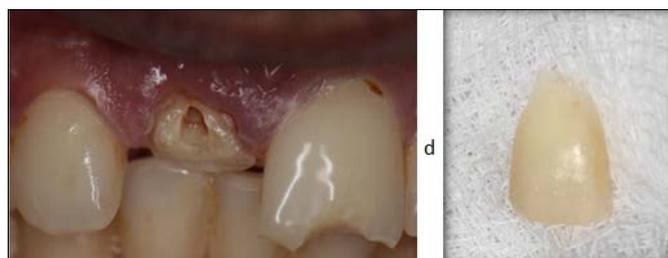


Fig 1d: Clinical crown after fractured fragment removal and isolated fractured tooth segment



Fig 1a: Pre-operative photograph (labial surface)



Fig 1f: Master cone selection IOPA



Fig 1g: Post-obturation IOPA



Fig 1k: Immediate post-operative IOPA



Fig 1h: Fiber post cementation after GP removal was done (radiograph)



Fig 1l: 3 Months follow-up clinical photograph



Fig 1m: 3 months follow-up radiograph



Fig 1i: Fiber post cementation after GP removal was done (photograph)



Fig 1j: Fragment re-attachment done after application of flowable composite resin (labially and palatally)

Case report 2

A 25-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of a broken upper front tooth 2 hours ago after a fall from her scooter. On a thorough clinical and radiographic examination, tooth number 12 had a crown fracture with no pulp involvement. There were no signs of periapical pathology and complete root formation was seen. The patient complained of severe sensitivity continuously after the trauma, based upon which the diagnosis derived was symptomatic reversible pulpitis following uncomplicated crown fracture. The patient had the fractured tooth segment stored in water in a jar. On further examination, it was noted that the fracture was essentially involving only enamel and

dentin, and hence the treatment plan formulated was re-attachment of the fractured tooth segment using flowable composite resin. Rubber dam isolation was done, followed by try-in of the fractured tooth segment for re-attachment. The segment had an accurate fit with the tooth. Acid etching of both the tooth and the fractured segment were done using 37% ortho-phosphoric acid for 15 seconds, followed by bonding agent application on both the tooth and the fractured segment using Scotchbond Universal (3M ESPE), and it was cured for 20 seconds. Flowable composite resin (3M ESPE) of A2 shade was used to re-attach the fractured tooth segment onto the tooth, and it was tac-cured for 3 seconds to remove the flash. It was followed by curing on both labial and palatal surfaces for 20 seconds each. Finishing and polishing was done, which gave satisfactory esthetics to the tooth. The patient was followed up for 1 and 3 months, and it showed the tooth to be vital and absence of radiographical pathologies.

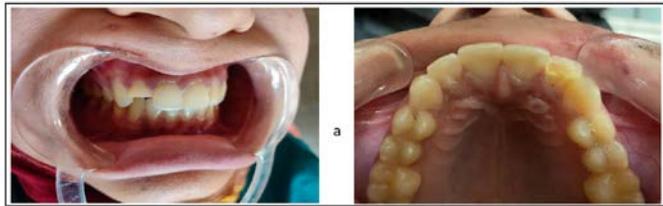


Fig 2a: Pre-operative clinical photographs (labial and palatal surfaces)



Fig 2b: Pre-operative radiograph

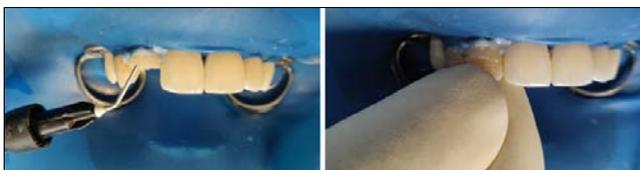


Fig 2c: Re-positioning of the fractured tooth segment to the clinical crown using flowable composite resin material



Fig 2d: Post-operative clinical photograph after fragment re-attachment



Fig 2e: Immediate post-operative IOPA



Fig 2f: 3 months follow-up clinical photograph



Fig 2g: 3 Months follow-up radiograph

Discussion

With the advent of new adhesives in dentistry, it creates newer opportunities for reconstruction/reattachment of fractured teeth and achieve excellent esthetics. The advantage of this alternative treatment includes regaining colour and size of the original tooth, being worn away in similar proportion to adjacent tooth and giving positive psychological response to the patient and is also economical [7]. According to Cavalleri and Zerman, the long-term prognosis of reattached fragment is better than that of composite resin restorations [8].

Other restorative modalities such as ceramic laminates or crowns, tend to sacrifice large amounts of tooth structure, making the colour matching to the adjacent teeth difficult [9]. The variety of materials, such as adhesive systems and composite resins, combined with the skill and knowledge required to mimic the shape, colour, and texture of a tooth make the realization of direct composite resin restorations difficult [10].

Dehydration of the fragment may result in a change in dental colour and a decrease in the fracture strength of the tooth. Proper rehydration of the fragment has the capability of restoring both colour and strength [11, 12]. Farik and others evaluated the fracture resistance of dehydrated and rehydrated

teeth over different periods of time. When the fragment remains dehydrated for more than one hour, the fracture resistance decreases significantly. In the same study, the authors observed that when the specimen remains dehydrated for more than 24 hours, the optimal rehydration time given was a period equal to, but not less than, 24 hours. This will ensure the maintenance of the adhesive strength [13].

The choice of materials and techniques varies according to the studies [16]. Some have shown that the associations of materials used for reattachment did not influence the bond strength of the fractured tooth [17, 18]. With other authors, the material was less influential than the technique used at the time of reattachment [19]. Another factor influencing the final bond strength results is maintaining adequate hydration or even rehydration of a dehydrated tooth fragment before the restorative procedure, which both favours maintaining the original colour of the fragment and influences the bond strength values. Capp *et al.* reported that the BS could be partially recovered if the dental fragment was rehydrated for only 30 min prior to reattachment, a procedure conducive to better clinical management [20].

One disadvantage of the fragment reattachment technique is the possible debonding of the segment due to progressive degradation of the adhesive interface, a new traumatic injury or parafunctional habits involving the restored tooth [21, 22]. Nevertheless, fragment reattachment to its remnant, when feasible and well adapted, is considered to be the best choice in the case of coronal fracture, since it favours the practice of minimal intervention and restores resistance and aesthetics satisfactorily.

In this case series, we used the fragment available for reattachment over other treatment options as the fragment was intact, in good condition, showed proper adaptation and mimicked the adjacent tooth thereby providing excellent esthetics. Also, prefabricated fiber post was used following endodontic treatment to aid in reinforcement and better long-term prognosis of the tooth in the first case, whereas in the second case, fragment re-attachment with adequate isolation would suffice the objective of saving the tooth for the long-term.

Conclusion

Complicated and uncomplicated coronary fractures require careful assessment and diagnosis to achieve predictable esthetic outcomes. Fragment reattachment presents good, affordable, esthetic and immediate treatment outcome for management of coronal fractures with good patient acceptance.

References

- Andreasen JO. Etiology and pathogenesis of traumatic dental injuries A clinical study of 1,298 cases. *European journal of oral sciences*. 1970 Aug;78(1-4):329-42.
- Andreasen JO, Andreasen FM, Andersson L. *Textbook and Color Atlas of Traumatic Injuries to the Teeth*. Blackwell, Oxford, UK, 2007.
- Badami V, Reddy SK. Treatment of complicated crown-root fracture in a single visit by means of rebonding. *The Journal of the American Dental Association*. 2011 Jun 1;142(6):646-50.
- Olsburgh S, Jacoby T, Krejci I. Crown fractures in the permanent dentition: pulpal and restorative considerations. *Dental Traumatology*. 2002 Jun;18(3):103-15.
- Terry DA. Adhesive reattachment of a tooth fragment: the biological restoration. *Practical Procedures and Aesthetic Dentistry*. 2003 Jun 1;15(5):403-9.
- de Castro JC, Poi WR, Pedrini D, Tiveron AR, Brandini DA, de Castro MA. Multidisciplinary approach for the treatment of a complicated crown-root fracture in a young patient: A case report. *Quintessence International*. 2011 Oct 1;42(9).
- Baratieri LN, Monteiro Jr S, Cardoso AC, de Melo Filho JC. Coronal fracture with invasion of the biologic width: A case report. *Quintessence International*. 1993 Feb 1;24(2).
- Lise DP, Vieira LC, Araújo É, Lopes GC. Tooth fragment reattachment: the natural restoration. *Operative dentistry*. 2012 Oct;37(6):584-90.
- Krastl G, Filippi A, Zitzmann NU, Walter C, Weiger R. Current aspects of restoring traumatically fractured teeth. *Eur J Esthet Dent*. 2011 Jun 1;6.
- Cavalleri G, Zerman N. Traumatic crown fractures in permanent incisors with immature roots: a follow-up study. *Dental Traumatology*. 1995 Dec;11(6):294-6.
- Murchison DF, Burke FJ, Worthington RB. Incisal edge reattachment: indications for use and clinical technique. *British dental journal*. 1999 Jun;186(12):614-9.
- Rappelli G, Massacesi C, Putignano A. Clinical procedures for the immediate reattachment of a tooth fragment. *Dental traumatology*. 2002 Oct;18(5):281-4.
- Vilela EA, Baratieri LN, Caldeira de Andrada MA, Monteiro Jr S, Medeiros de Araújo J. Tooth fragment reattachment: Fundamentals of the technique and two case reports. *Quintessence International*. 2003 Feb 1;34(2).
- Krastl G, Filippi A, Zitzmann NU, Walter C, Weiger R. Current aspects of restoring traumatically fractured teeth. *Eur J Esthet Dent*. 2011 Jun 1;6.
- Farik B, Munksgaard EC, Andreasen JO, Kreiborg S. Drying and rewetting anterior crown fragments prior to bonding. *Dental Traumatology*. 1999 Jun;15(3):113-6.
- Reis A, Loguercio AD, Kraul A, Matson E. Reattachment of fractured teeth: a review of literature regarding techniques and materials. *Oper Dent*. 2004;29:226-233.
- Reis A, Kraul A, Francci C, de Assis TGR, Crivelli DD, Oda M *et al.* Reattachment of anterior fractured teeth: fracture strength using different materials. *Oper Dent*. 2002;27:621-627.
- Chazine M, Sedda M, Ounsi HF, Paragliola R, Ferrari M, Grandini S. Evaluation of the fracture resistance of reattached incisal fragments using different materials and techniques. *Dent Traumatol*. 2011;27:15-18.
- Reis A, Francci C, Loguercio AD, Carrilho MR, Rodrigues Filho LE. Reattachment of anterior fractured teeth: fracture strength using different techniques. *Oper Dent*. 2001;26:287-294.
- Capp CI, Roda MI, Tamaki R, Castanho GM, Camargo MA, De Cara AA. Reattachment of rehydrated dental fragment using two techniques. *Dent Traumatol*. 2009;25:95-99.
- Singhal R, Pathak A. Comparison of the fracture resistance of reattached incisor tooth fragments using 4 different materials. *J Indian Soc Pedod Prev Dent*. 2012;30:310.
- Worthington RB, Murchison DF, Vandewalle KS. Incisal edge reattachment: the effect of preparation utilization and design. *Quintessence Int*. 1999;30:637-643.