

Conservative Management of Traumatized Young Permanent Tooth: A 1-Year Follow-Up

Toijam Khema Devi, Kusum Bharti, Poornima Tripathi

Department of Pediatric and Preventive Dentistry, K.D. Dental College and Hospital, Mathura, Uttar Pradesh, India

Abstract

Traumatic exposure of pulp in immature permanent teeth is most commonly observed in pediatric patients. Preserving the dental pulp is an important factor while treating an incompletely formed root of a traumatized tooth. Cvek pulpotomy is a method which helps in maintaining its vitality by providing a favorable environment for continued root development. This report describes a case of a young patient whose maxillary right central incisor suffered crown fractures because of a traumatic accident in school. Cvek pulpotomy with mineral trioxide aggregate was performed in order to achieve apexogenesis, and the tooth was restored with glass ionomer cement and the tooth fragment was reattached. The patient was recalled at 1, 3, 6, and 12 months.

Keywords: Cvek pulpotomy, Ellis class III fracture, mineral trioxide aggregate

INTRODUCTION

Dental traumatic injuries are most common in young children.^[1] Fractures in enamel, dentine, and pulp have been named complicated crown fractures. Due to the position in the arch and labial proclination, maxillary central incisor is considered to be the most susceptible tooth to crown fractures.^[2] The percentage of crown fractures with pulp exposure can reach to 13% of all dental traumatic injuries (Webber RT 1984).^[3] For the treatment of exposed immature vital teeth, partial pulpotomy/Cvek pulpotomy is an alternative treatment option. The contributing factors for a successful partial pulpotomy are the time duration after exposure of the pulp to the oral environment and the extent of pulp damage.^[4] Treatment plan should be done in such a way to preserve the vitality of the pulp in order to achieve continued root development.^[5] Its vitality can be preserved after traumatic exposure with obvious outcomes with the use of suitable biomimetic materials. Mineral trioxide aggregate (MTA) is an effective capping agent which is more biocompatible and forms a thick bridge in order to seal and preserve the pulp tissue under it. Thus, the purpose of this case report is to describe a case in which vital pulp therapy for traumatically exposed maxillary right central

incisor pulp was performed using MTA followed by fractured tooth fragment reattachment.

CASE REPORT

A 10-year-old boy came to the Department of Pediatric and Preventive Dentistry with the chief complaint of broken tooth on his upper front teeth region while playing in the school 1 day before. On examination, Ellis class III fracture with clinical pulp involvement was observed in relation to 11 [Figure 1a]. Fortunately, the child picked the broken tooth fragment and brought it to the department. The fragment was immediately kept in a normal saline solution to avoid dehydration throughout the dental treatment for further use. The tooth was firm and gave a positive pulpal response on electric pulp testing, indicating the pulp vitality. Radiographic examination revealed that the root of 11 was incompletely formed with an open apex with no apparent periapical abnormality or alveolar bone fracture [Figure 1b]. Hence, Cvek pulpotomy or partial pulpotomy with MTA was planned as a treatment option.

Address for correspondence: Dr. Toijam Khema Devi, K.D. Dental College and Hospital, P.O. Chhatikara, Mathura - 281 006, Uttar Pradesh, India.
E-mail: ktbabyton@gmail.com

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CLINICAL PROCEDURE

The tooth was anesthetized with 0.5 ml lignocaine (lignox 2%, adrenaline 1:80,000) administered locally. The isolation was carried out with a cotton roll instead of a rubber dam because of the child being anxious. With the help of high-speed round bur, the superficial layer of exposed pulp and the surrounding tissue was excised to a depth of 2–3 mm. The exposed area

was irrigated with isotonic saline, and then, a moist cotton plug was placed to arrest bleeding to avoid clot formation. MTA (Grey MTA plus, Avalon Biomed Inc., USA) was mixed as per the manufacturer's instruction and applied on the exposed pulpal surface and above this glass ionomer cement (GIC, Ketac Molar, 3M ESPE, St. Paul, USA) was used to seal it [Figure 2a]. A radiograph was taken to confirm the placement of MTA.

The tooth surfaces to be attached were etched for 20 s with 37% orthophosphoric acid (Smart etch, Safe Endo, India) [Figure 2b], rinsed for 20 s, and then air-dried. A thin layer of bonding agent (Solare Universal Bond, GC, India) was applied and cured for 20 s. Finally, the tooth fragment was reattached using flowable composite (Te-Econom Flow, Ivoclar Vivadent, Schaan, Liechtenstein) [Figure 2c-e] and light cured for 30 s. The patient was recalled after 1 [Figure 3a], 3 [Figure 3b], 6 [Figure 3c], and 12 months [Figure 3d] for clinical and radiographical evaluation. After 12 months, a positive result was found; periapical radiographic views showed no periapical radiolucency, and the root continued its development with thickening of dentinal walls. Hard tissue barrier was observed beneath MTA. Clinical examination

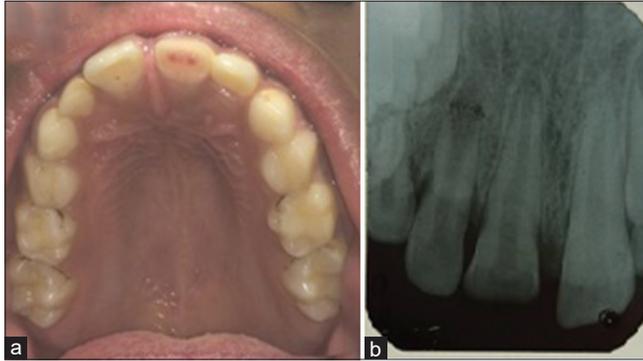


Figure 1: (a) Preoperative photograph showing Ellis class III fracture in 11 with pulpal exposure; (b) Preoperative radiograph revealing fracture in 11 with pulpal involvement.

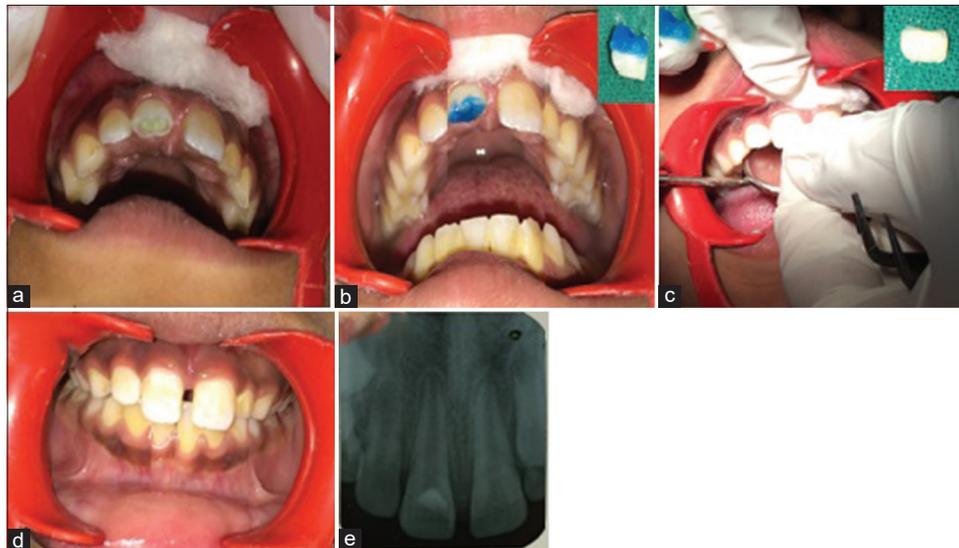


Figure 2: (a) Partial pulpotomy performed in 11 with MTA followed by GIC restoration; (b) Image showing etching of tooth and fragment; (c) Fractured fragment reattachment (d) Postoperative photograph after fracture reattachment; and (e) Postoperative radiograph immediately after reattachment.

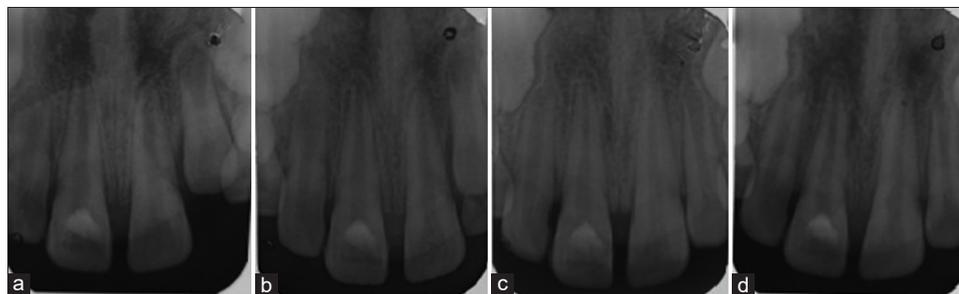


Figure 3: Radiographic image of the fractured permanent maxillary 11 after (a) 1-month follow-up (b) 3-month follow-up (c) 6-month follow-up (d) 12-month follow-up.

showed no tenderness to percussion, and the electric pulp tester showed a positive response. However, a slight discoloration can be seen toward the cervical area. Hence, in order to camouflage the discoloration, composite veneering was done.

DISCUSSION

According to the American Association of Endodontists guidelines 2003, partial pulpotomy (shallow pulpotomy; Cvek pulpotomy) can be defined as “The surgical removal of a small portion of the coronal portion of a vital pulp as a means of preserving the remaining coronal and radicular pulp tissues.”^[6] Saliva and oral bacteria cause pulpal contamination after traumatic exposure due to increased time interval between initial exposure and treatment. Hence, the removal of pulp should be extended apically to confirm complete decontamination of the remaining pulp.^[7] In immature permanent teeth, preserving the remaining pulp is the main goal of vital pulp therapy to treat reversible pulpal injuries in order to lead to the continuous development of roots with thickening of dentinal walls. For a successful treatment, the pulp capping material used in vital pulp therapy can be extremely effective. In this case, the time elapsed between the exposed pulp is 24 h which had a very good chance of survival as according to Ingle, after 48 h, chances of maintaining a healthy pulp decrease due to direct bacterial contamination, which could lead to a zone of inflammation progressing apically.^[8] While Cvek stated that neither the time interval between pulpal exposure and treatment nor the size of exposure site or status of root development are essential factors for the success of partial pulpotomy if the inflamed outermost pulp is removed properly.^[9-11] Due to the availability of the fragment in a single mass, its close approximation to the tooth without any discrepancy, minimal time lapse, and patient’s willingness indicated reattachment of the fragment with vital pulp therapy, partial pulpotomy followed by fracture reattachment was done. MTA is a bioactive cement that has been proved to be an effective pulp-capping material. It can also induce pulp cell proliferation and hard tissue formation. MTA has the advantages of hydrophilic nature, nonabsorbable, a relatively high compressive strength, and a sustained high alkaline pH. Kang *et al.* reported favorable clinical and radiographic outcomes for partial pulpotomy performed in permanent teeth with three different types of MTA (including ProRoot MTA) after 1 year.^[12] In addition, the formation of a calcified barrier below MTA has been observed by the investigators as a successful response to vital pulp therapy. This finding was also observed in this report. Despite favorable outcomes, coronal discoloration is one potential drawback of MTA formulations which was evident in our case. Other alternatives such as bioceramic-based cements have also been reported.^[13] For a successful partial pulpotomy, a good restoration that inhibits bacterial penetration into the tooth is necessary. Yilmaz *et al.* assessed a successful fractured crown fragment reattachment to the remaining tooth structure. The use of combined flowable and hybrid resin composite showed favorable results in reattaching the tooth’s fractured incisal

part.^[14] Reattachment of the fractured fragment is economical, safe, and a less time-consuming procedure providing natural esthetics with a very conservative approach, a positive emotional and social feedback from the patient as compared with that of the conventional method.^[15]

The child, after 1-year follow-up, was satisfied with the treatment with no symptoms except for the discoloration which was later camouflaged with composite resin.

CONCLUSION

Esthetics, physical and psychological development are influenced by traumatic injuries in a growing patient. This case report provides maintenance of the vitality of an immature tooth after traumatic injury in a conservative approach by preserving its esthetics, functions, and healthy periodontal tissues. The absence of pain is another important factor leading to a positive result of this treatment. Proper hemorrhage control, accurate material placement, and correctly sealed restoration are essential for a successful vital pulp therapy.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Andreasen FM, Andreasen JO. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 3rd ed. Copenhagen: Munksgaard; 1994. p. 216-56.
2. Andreasen JO. Etiology and pathogenesis of traumatic dental injuries. A clinical study of 1,298 cases. *Scand J Dent Res* 1970;78:329-42.
3. Webber RT. Apexogenesis versus apexification. *Dent Clin North Am* 1984;28:669-97.
4. Heide S, Mjor IA. Pulp reactions to experimental exposures in young permanent monkey teeth. *Int Endod J* 1983;16:11-9.
5. Kvinnsland SR, Bårdsen A, Fristad I. Apexogenesis after initial root canal treatment of an immature maxillary incisor – A case report. *Int Endod J* 2010;43:76-83.
6. Malhotra R, Singh S, Grover N. Partial pulpotomy for complicated crown fractures in immature permanent teeth. *J Case Rep* 2013;3:419-23.
7. Swift EJ Jr., Trope M. Treatment options for the exposed vital pulp. *Pract Periodontics Aesthet Dent* 1999;11:735-9.
8. Reis A, Loguercio AD, Kraul A, Matson E. Reattachment of fractured teeth: A review of literature regarding techniques and materials. *Oper Dent* 2004;29:226-33.
9. Cvek M, Cleaton-Jones PE, Austin JC, Andreasen JO. Pulp reactions to exposure after experimental crown fractures or grinding in adult monkeys. *J Endod* 1982;8:391-7.
10. Cvek M. Partial pulpotomy in crown-fracture incisors: Results 3-15 years after treatment. *Acta Stomatol Croat* 1993;27:167-73.
11. Cvek M, Lundberg M. Histological appearance of pulps after exposure by a crown fracture, partial pulpotomy, and clinical diagnosis of healing. *J Endod* 1983;9:8-11.
12. Kang CM, Sun Y, Song JS, Pang NS, Roh BD, Lee CY, *et al.* A randomized controlled trial of various MTA materials for partial pulpotomy in permanent teeth. *J Dent* 2017;60:8-13.
13. Tuloglu N, Bayrak S. Partial pulpotomy with bioaggregate in complicated crown fractures: Three case reports. *J Clin Pediatr Dent* 2016;40:31-5.
14. Yilmaz Y, Zehir C, Eyuboglu O, Belduz N. Evaluation of success in the reattachment of coronal fractures. *Dent Traumatol* 2008;24:151-8.
15. Hegde RJ. Tooth fragment reattachment – An esthetic alternative: Report of a case. *J Indian Soc Pedod Prev Dent* 2003;21:117-9.