ORIGINAL ARTICLE

MANAGEMENT OF COMPLICATED CROWN FRACTURE USING CVEK PULPOTOMY AND MODIFIED SIMONSONS TECHNIQUE

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ABSTRACT

Case of 11 year old female patient with traumatized permanent maxillary right central incisor having complicated crown fracture is reported here. Endodontic management included partial pulpotomy (Cvek technique) to maintain pulpal vitality. Restorative management included nano hybrid composite resin restoration and reattachment of the teeth using modified Simonson's technique with interproximal notches. Treatment was considered successful in this case according to the following criteria of success that was absence of clinical symptoms, absence of radiographic signs of pathology, and presence of pulpal vitality within 3 and 6 months follow up subsequently.

Keywords: *Tooth Fracture, Tooth Injuries, Pulpotomy, Nano hybrid composites*

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INTRODUCTION

Facial trauma represents a public health problem that need urgent approaches to deal with, commonly involving children between 2 to 3 years and between 8 to 12 years of age groups. Teeth and periodontal structures are primarily affected. Domestic voilence,fights,-falls, traffic accidents are the common causes. Dental fractures due to trauma frequently involve enamel, both enamel and dentin without pulp involvement or with pulpal involvement are termed as simple and complex fractures respectively.The maxillary incisors due to their position are most commonly reported teeth with occasional involvement of 80% centrals and 16% laterals. Among many classifications dental traumatic injuries are classified on basis of radiological examinations and vitality by Ellis and Davery on a numerical system (I to VIII)[1,2]

Fractured anterior teeth and its rehabilitation is a clinical challenge in dentistry as it involves the aesthetic region. Prognosis of fractured anterior teeth depends on the fracture line extent, pulpal health,recovered tooth portion,occlusion. Crown/tooth fragment reattachment represents a useful alternative for short term and medium term results to conventional restorative techniques (eg composite resin restorations, post and core full crown restorations).Acid etch technique was first introduced by Tannery for fracture reattachment that was later advocated by Starkey and Simonson. Contemporarily, hybrid composites used for fracture reattachment allows more conservative preparation design like feather-edge; chamfer; shoulder and long bevel (45° external circumferential). Satisfactory tooth restoration interface with the fracture line above the cervical third is prerequisite for these preparation designs, but not applicable in case of biological width violation.[3,4]

Management of traumatized tooth by biologic tooth restoration has optical and mechanical properties equivalent to a natural tooth. Reattachment of original retained or recovered tooth fragment has certain advantages in terms of esthetics, shade matching and natural tooth contours with additional advantage of durability because of natural incisal wear resistance of a sound dental tissue.It is a restorative option which is acceptable in permanent as well as primary tooth and is conservative, cost-effective and a less time-consuming.[5]

Dental trauma causes pulpal exposure along with crown fractures which is usually of sound teeth.Vital pulp therapies are the procedure to salvage the affected teeth as preservation of pulpal vitality is always prime objective in young patients.In teeth with crown fractures and pulpal exposures various modalities could

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be used depending on trauma as prime factor, extent of pulpal involvement ,whether the exposure is deep and remained open to oral environment and biofilms for longer time,is the exposure carious or mechanical, age and maturity of tooth apices. Depending on how pulp gets affected,treatment modalities are opted. Opted options can be direct pulp capping,partial pulpotomy, pulpectomy, or extraction. In trauma of young patients teeth,the exposed pulp usually maintains its vitality if reported earlier to dentists for treatments, pulpotomy is the best endodontic treatment option in order to maintain pulpal functions. A partial pulpotomy, known as the Cvek technique, is indicated for teeth having the following characteristics: small pulp exposure,minimal time window period between trauma and treatment, caries-free, open apex or thin dentinal walls, and vital and asymptomatic pulps. This technique involves amputation of the pulp 2mm apical to the affected pulp tissue, but it is not recommended for those cases in which the pulp exposure is extensive or where there has been a 2-week lapse between trauma and treatment.[1,2,3,6]

The purpose of reporting the present case is to explain the treatment of a case of traumatized tooth with complicated crown fracture using cvek pulpotomy along with fragment reattachment using simonsen's technique

CASE REPORT

Eleven year old female patient resident of Islamabad, from moderate socioeconomic status reported to Out patient diagnosis of Operative department Rawal Institute of Health sciences on 7th November 2017. She complained of fractured front tooth and bleeding lips due to fall from stairs, less than 24 hours before with no history of getting unconscious. Medical, dental and drug history are non contributory. Tetanus injection was given 21 hours back on same day by local hospital. On clinical examination extra orally, lip lacertions were seen with normal facial profile and symmetry, Temporomandibular joint examination was also normal.Intraorally oral hygiene was poor. Frontal oral region was primarily affected,tender on palpation with fracture and exposed pulp of maxillary right central incisor as shown in fig 1(a). Soft tissue mucosa was seen swollen and bruised.For maxillary right central incisor, periapical radiographic examination showed complete root development, closed apices, no periapical injury, and no alveolar bone fractures. Treatment procedure involved administration of local anesthesia at affected tooth followed by rubber dam isolation. Fragment of fractured tooth was recovered from tooth which was half attached to it and restored in saline for time being with careful handling as shown in fig 1(b)(c). Small round carbide bur was used for sieving of 2mm of pulpal depth for the partial pulpotomy of the central incisor with hypoclorite rinses of that area,hemostasis was evident in 2 min.Then calcium hydroxide (Ca[OH] paste(Dentsplay) was placed, followed by a lining coat of glass ionomer (GC gold label universal restorative). The fractured fragment of maxillary right central incisor was reunited using a modified Simonson's technique which is a bevel type of preparation to provide a good finishing line for restoration with creation of notches interproximaly area for improve retention. Etching (Syringe meta etchant)was done for 20 seconds for enamel present on both tooth fragment and tooth respectively,followed by washing, drying, applying bonding(Bottle Meta P&Bond) and nano hybrid composite Nexcom(Meta bio med)in between two segments and notches for masking up the fracture line and cured, finshing and polishing was done at the end as shown in fig 1(d)(e).

Clinical and radiographic examinations were made after treatment as shown in Fig:2. On follow up examination after 3 months and 6 months subsequently, there was stable tooth fragment with no discoloration,patient reported no pain on biting,clinically cold test showed vital response, percussion and palpation tests were negative,no gingival swelling and no sinus tract formation. On radiographic examination,there was no obvious developing radiolucency,periapicaly and laterally and intact lamina dura. Restoration was functional and aesthetically acceptable by the patient.

DISCUSSION

Dental trauma (DT) is a commonly reported problem with impact on quality of life.School-going children who experienced teeth injuries according to past statistics is 25%.[7] Study showed 18% to 20%of traumatic injuries involving the maxillary permanent teeth having complicated fractures.[8]

The present case reported crown fracture with horizontal fracture line due to forces direction and pulpal involvement, immediate addressing of complicated crown fracture by coronal fragment reattachment was reported in literature with soft tissue and pulpal tissues treatment addressed first.[9]Hence,in present case soft tissue was thoroughly cleaned with saline to check the extent of trauma and stored fractured fragment of tooth in saline but many literature suggested milk as storage medium[1,2,10]).Radiographs were taken to rule out any suspected root fracture of intact tooth part. Localized gingival curettage was done to clear any present debries around the gingival crevice as it will promote wound healing and minimize inflammmation and contamination.Treatment options for involved pulp include vital pulp therpies or pulpectomy, depending on the time between the trauma and treatment of the patient, degree of root development, and size of the pulp exposure.[1,11,18]

Partial cvek pulpotomy may be the preferred treatment in cases of minimal pulpal exposures when pulpal vitality and the time elapsed between trauma and treatment allow for this option,that is why the current study used the cvek pulpotomy approach as the reporting time was within 24 hours of trauma making it a suitable option and endorsed by past literature.Cvek,pioneer of the technique reported good results of treated cases of

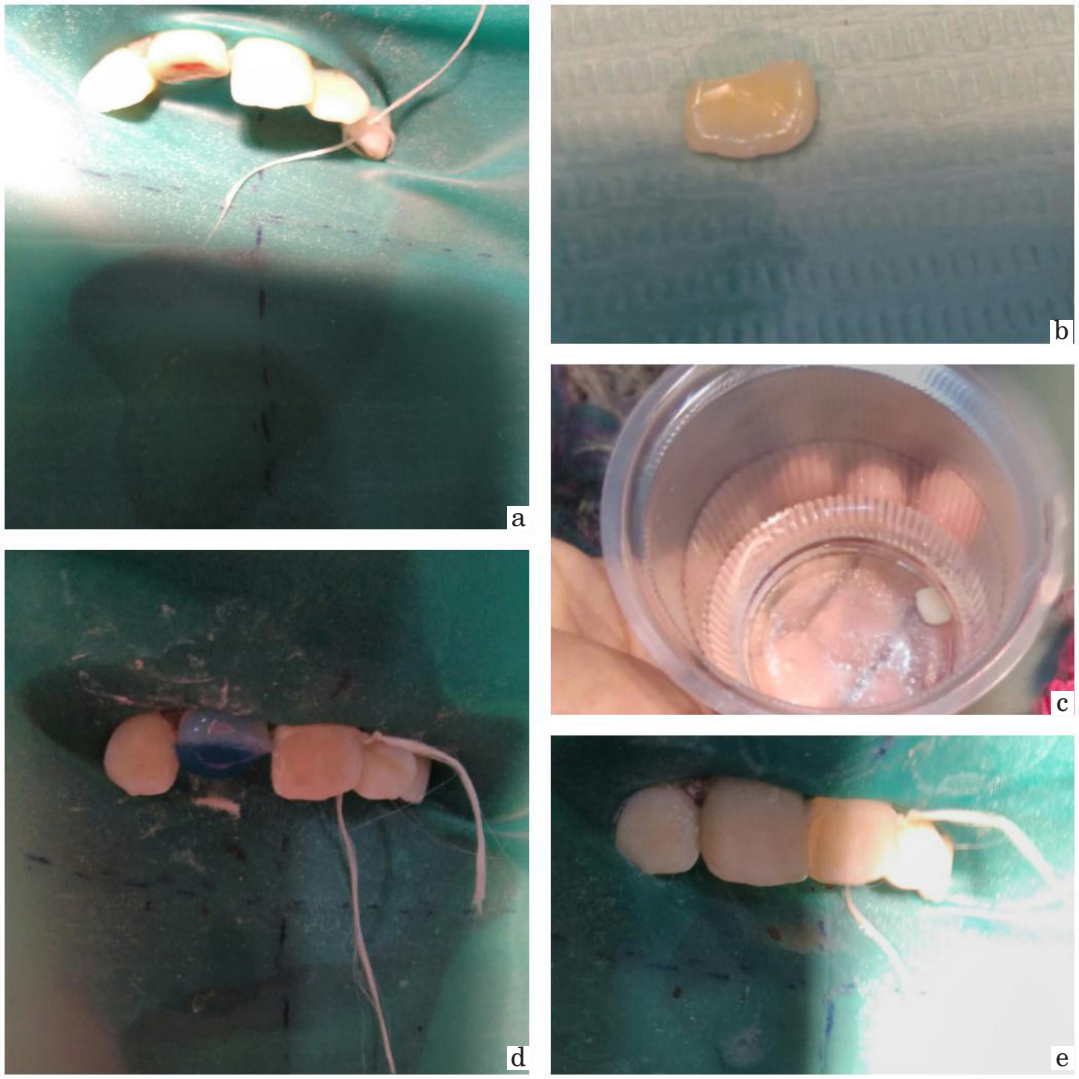

Fig 1 (a)Pretreatment exposed pulp before cvek pulpotomy(b)fractured tooth fragment(c)Tooth fragment in storage medium(d)Etching after tooh preparation by simonsons technique(e)Finished tooth with nanohybrid composite restoration.

Fig 2:Post operative clinical picture and Radiograph

complicated crown fractures by partial pulpotomy(96%) having a follow up for 30 hours elapsed between trauma and treatment[3,11].Partial pulpotomy has a high success rate in cases with complicated crown fractures in young teeth with pulp exposure. Present case used the modification of fragment reattachment techniques after addressing pulpal issues with interproximal grooves in tooth for better retention eventual natural esthetic restoration.[4,12] Opting treatment options are related to fracture line extent and present prognosis of the tooth. Recent evidence based improvements in restorative materials, placement techniques,cavity desgins,and material bonding protocols have benefited clinicians with opting more practical approach.Contemporary dentistry advancements make the application of etch and bond systems with improved techniques. The union of fragment has become simplified,which we also tried to follow in present case. Mineral trioxide aggregate (MTA) and enamel matrix derivative (EMD) are current materials under use for pulpotomy MTA's has a barrier creation ability and EMD has ability of dentinogenesis because of presence of protein-rich fraction in it. However, Ca(OH)2 continues to be the material of choice for pulpotomy because of easy availability,antibacterial,alkaline nature reperative dentinogenesis.[13,14,15]

The choice of intermediate materials, which may be composite resin, flow resin, resin cement or glass ionomer, also varies but in present study glass ionomer cement restorative material was used.Nano hybrids were used as definitive restorative material being good in terms of strength and esthetics with minimal finishing requirements in reported case.There are past case reports with use of flowable composite as restoring material too.[3,15]

Treatment output is based on clinical and radiographic follow up evaluations.[16,17]Vitality maintenance was checked as prime factor, like pulpal tissue condition before, after the trauma and after the treatment Clinical and radiographic examination showed no periodontal or periapical pathology with acceptable restorations. Follow up of 6 months was done, however, a long-term follow up is necessary to establish this success rate

CONCLUSION

Cvek pulpotomy with fragment reattachment using modified Simonson's technique represents an excellent immediate treatment for young permanent traumatized vital teeth with reporting time of less than 24 hours trauma.

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4 Nouman Anayat:	Discussion, Facilitating case treatment