

Fracture reattachment in conjunction with vital pulp therapy: conservative management of the Ellis class III fracture

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INTRODUCTION

Prevalence of traumatic dental injuries is being increasing in recent times considerably (1). Road traffic accidents (RTA) can be considered as major cause for the traumatic injuries. Other than RTA, fall from the height and physical violence may also lead to injury to the orofacial region which inevitably may include the dent alveolar structure as well. Traumatic dental injuries are broadly categorized in to fractures and luxation. As seen in the literature, fractures are more common in the permanent dentition whereas luxation injuries are more common in the primary dentition (2). Rationale for this could be possibly explained by the variation in the mineral content in both primary and permanent dentition. Although, primary dentition has its own importance, compared to it, permanent dentition usually considered as more valuable from patient's perspective. This is because the loss of any tooth of permanent dentition is irreplaceable naturally. Any injury to the permanent dentition either fracture or luxation calls for the consideration of the various prognostic factors which may affect the outcome. Further, increasing understanding regarding the biology of the pulpal inflammation and advancements in various materials along with the technological advancements has led to increased utilization of the conservative treatment modality (3). Recently, international association of dental traumatology has revised the guidelines regarding the traumatic dental injuries to guide for the management of such injuries (2). This paper reports the fracture reattachment in conjunction with vital pulp therapy as a conservative treatment modality of the Ellis class III fracture.

CASE REPORT

A 34 year old male patient with non-contributory medical history had reported to the department of Conservative Dentistry and Endodontics of Post Graduate Institute of Dental Sciences, Rohtak with the complaint of broken front tooth and sensitivity. History taking had revealed regarding the history of trauma due to road traffic accident few minutes back. At the same time, patient reported to the department with the fractured fragment in his hand. Upon clinical examination, there was a fractured maxillary right central incisor with fracture line involving the enamel, dentin and exposing the pulpal tissue on the distoincisal aspect. Palpation and percussion testing was normal. Pulp sensibility testing including electric pulp testing and cold test had shown heightened and earlier response compared to adjacent teeth. However, the response was not lingering. Upon radiographic examination, extent of the fractured line was confirmed. Further, periapical area of the fractured tooth was normal and there was no sign of pathosis. At the same time intraoral periapical radiographs with different horizontal and vertical angulations were obtained using the standard exposure parameters using the digital imaging system to rule out for the associated other dentoalveolar injuries. Based on the clinical and the radiographic findings, provisional diagnosis of the Ellis class III fracture with reversible pulpitis was made.

In this case report, two aspects were critically important: 1) adequate care of the pulpal tissue and 2)restoration of fractured tooth which proper form, function and adequate seal. Since the history of trauma was recent and tooth was vital, vital pulp therapy was chosen as a treatment modality for the management of the pulpal tissue. Regarding restorative aspect, although, adhesive restoration works well and satisfies even an aesthetic need, availability of the fractured fragment had kept possibility of fracture reattachment open as a treatment modality. Further, early reporting of patient to the dental care speciality had also minimized the chances of dehydration of fractured fragment. Still to prevent further dehydration, fractured fragment was cleaned and immediately immersed in normal saline. Patient was explained about the procedure, associated risk and benefits thoroughly and written informed consent was obtained from the patient before commencing the clinical procedure.



Clinical procedure

After thorough history taking, clinical and radiographic examination, collection of preoperative records, and formulating the treatment plan, treatment was initiated. Patient was anesthetized by infiltration injection using 2 % lidocaine and 1: 1, 00, 000 epinephrine. Subsequently, rubber dam isolation was obtained to prevent the risk of the salivary contamination. Following rubber dam application, tooth surface disinfection was done using the 5.25% sodium hypochlorite (NaOCL). Then, tooth surface both on the labial and palatal aspect was bevelled using tapered round diamond bur in high speed hand piece with water coolant. Exposed pulp tissue was managed by pulpotomy procedure. Superficial 2 mm of pulp tissue was removed using fresh, sterile round bur in high speed hand piece along with water coolant. Hemostasis was achieved using the 3 % sodium hypochlorite. Following hemostasis achievement Pro Root MTA was mixed according to the manufacturer's instruction and placed on the exposed pulpal wound in the thickness of approximately 2 mm. Subsequent to MTA placement, layer of resin modified glass ionomer cement was placed upon it. Then the restoration of the fractured tooth was done using fracture reattachment as a treatment modality. Before reattachment of the fractured fragment, it wassoaked in the saline solution for the purpose of rehydration and to even prevent the further dehydration. Before the reattachment of the fragment, it was bevelled both on the labial and the palatal aspect. Reason for this bevelling is to increase the surface area for the adhesive restoration. Subsequently, fragment and the tooth structure both were etched using gel etchant for 15 seconds. After that surface was rinsed, dried and the adhesive application was done using the micro brush and it was then light cured. Following it, first flowable and then packable composite resin was placed in the increment of not more than 2 mm and light cured each increment for up to 40 seconds. Restoration of the tooth by means of fracture reattachment was assessed for the high points on the palatal aspect and if it was present, reduced using flame shaped diamond bur along with the water coolant. Area of adhesive bonding of the fracture fragment on labial and the palatal aspects were then finished using finishing burs and polished using polishing disks. An immediate postoperative intraoral periapical radiograph was taken using standard exposure parameters to check for the adequacy of the treatment and as a baseline reference for the future comparison. Analgesic ibuprofen 400 mg was prescribed for the pain relief and patient was instructed to take it as per the need.



Figure 1: Clinical procedure – a) Preoperative photograph b) Preoperative radiograph c) Postoperative photograph d) Postoperative radiograph e) 12 months follow up

Outcome assessment

Patient was assessed for the pain relief at 1 week follow up after the intervention. Further follow ups were arranged at 6 and 12 months period for the assessment of success. Patient was instructed to report to the clinician, if any symptoms appear in relation to the treated tooth. Success analysis was based on the clinical as well as radiographic success (4). In present case report, at the end of one year, patient was asymptomatic. Further, there was no signs present related to pulpal and periapical disease in relation to treated tooth. Also soft tissue surrounding the tooth was normal.



Radiographically, at the end of follow up, there was no evince of pathosis related to periapical disease in association with the treated tooth. Based on all these findings, treatment was considered as successful at 1 year follow up.

DISCUSSION

Management of the complicated crown fracture depends on the variety of the tooth, patient and the treatment related prognostic factors. In present case report, we utilized fracture reattachment as a treatment modality due the availability of the fractured fragment. Further, exposed pulp tissue was managed using the pulpotomy procedure. Here, we preferred pulpotomy procedure over the direct pulp capping since, pulpotomy removes the superficial infected or contaminated pulp tissue as well as it provides adequate space for the pulpotomy agent and at the same time it helped in approximation of the fractured fragments(5, 6). Successful outcome obtained in the present case report at one year follow up emphasizes upon the minimally invasive treatment modality with focus on conservation of the tooth structure.

Restoration of the fractured tooth usually done using the adhesive restoration. Such restorations provide adequate seal, proper form, and also satisfies the aesthetic need (7). However, to achieve restoration with optimal outcome, depends on various material and technique related factors. Composite resin, although, satisfies the majority of demands as a restorative material and commonly used in clinical practice, is associated with the risk of the staining over a period of time and polymerization shrinkage. In present case report, availability of the fractured fragment with patient had kept fracture reattachment treatment option open with minimal risk of the aesthetic concern.

Management of the pulpal tissue was also done conservatively by the means of the pulpotomy procedure in this case report. Preservation of pulp benefits biologically by preserving its function such as nutrition, proprioception, immunological function and reparative dentin formation (8).Earlier reporting of patient following the history of trauma has favoured the utilization of the vital pulp therapy technique in the present case report. Successful outcome obtained in the present case report although emphasizes upon the conservative treatment modality, at the same time, one must critically think for the evolution of the technique which benefits the patient for the long period. Considering the facts, MTA is associated with the risk of the discoloration over a period of time (9, 10). Therefore the use of the other trisilicate based material should be consider in future case reports to minimize such long term complications.

CONCLUSION

Fractured reattachment in conjunction with vital pulp therapy technique can be considered as effective and the most conservative treatment option for the management of the tooth with Ellis class III fracture.

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