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# Conservative management of complicated crown fracture with symptomatic irreversible pulpitis

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## ABSTRACT

**Aim:** to report the minimally invasive treatment modalityfor the management of tooth with complicated crown fracture with symptomatic irreversible pulpitis.

**Summary:** this paper presents pulpotomy as a minimally invasive treatment modality for the management of tooth with complicated crown fracture and symptomatic irreversible pulpitis. Mineral trioxide aggregate (MTA) was used as a pulpotomy agent. A layer of glass ionomer cement followed by placement of composite resin was used for definitive restoration. Patient was followed up after 1 week for the assessment of relief from symptoms. Further follow ups were scheduled at 6 and 12 months for the assessment of clinical and radiographic success.

**Key words:** Mineral trioxide aggregate, Pulpotomy, Symptomatic irreversible pulpitis

## INTRODUCTION

Traumatic injuries involving the orofacial region commonly involves dentoalveolar structures as well (1). In broad aspect,such traumatic dental injuries can be divided into luxation injuries or the dentoalveolar fractures. Further, in terms of prevalence, dentoalveolar fractures are more common in permanent dentition as compared to primary dentition (2). Management of such dentoalveolar fracture cases depends on various prognostic factors. These factors include the type of fracture whether complicated or not, root maturation status, time lapse between the timing of injury and management, remaining tooth structure and restorability of tooth structure, periodontal status of the tooth and associated other injuries (1). Critical evaluation of all such factors becomes necessary,while managing cases of dentoalveolar fracture. Consideration of all these factors in a comprehensive mannermay better help clinician in making appropriate treatment plan which ultimately benefits the patient by provision of best treatment option according to the clinical condition.

Complicated crown fractures simply means that fracture line involving dental hard tissue with the exposure of pulpal tissue. Extent of fracture line and remaining tooth structure determines the restorability of tooth. Status of the exposed pulpal tissue is the prime determining factor which affects the treatment plan. Further, root maturation status whether complete or incomplete, also considerably influences the treatment plan and outcome (2). The present case report highlights the concepts of the management of the complicated crown fracture with adequate care of aesthetic considerations.

## CASE REPORT

A systemically healthy (ASA II), 32 years old female patient had come 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 to hot and cold. History taking had revealed that there was a history of trauma to the upper front teeth due to fall from the stairs one day back. Upon clinical examination, there was a fractured left maxillary central incisor with fracture line involving enamel and dentin with pulpal exposure on the mesioincisal aspect.Further, there was no tenderness in association with fractured tooth upon palpation and percussion testing. However, pulp sensibility testing including electric pulp testing and cold testing had shown heightened and lingering response to stimulus suggestive of vital inflamed pulp. Further, radiographic examination had confirmed the extent of fracture line which was at supragingival level.No periapical changes were evident on radiograph in association with the fractured tooth and periapex was considered to be healthy.Intraoral periapical radiographs with different vertical and horizontal angulations were taken using digital imaging system (Carestream RVG 5200, Carestream Health Inc, Rochester, NY)to rule out the associated dentoalveolar injury as suggested by guidelines for the traumatic dental injury. Based on clinical and

radiographic examination, provisional clinical diagnosis of Ellis class III fracture with symptomatic irreversible pulpitis in relation to maxillary left central incisor was made. Possible treatment options, benefits and associated risks and consequences were discussed with patient. Emphasis on pulpal preservation and various advancements related to vital pulp treatment and patient's compliance towards dental care had led to the conservative management protocol of the present case report. Written informed consent was obtained from the patient before the commencement of the procedure.

**Procedure**

After a thorough clinical and radiographic examination, treatment procedure was commenced. Profound anaesthesia was achieved using the 2 % lidocaine with 1: 1,00, 000 epinephrine (Ramson remedies, Amritsar, India), given as infiltration injection in the periapical area of the fractured tooth. Subsequently, operating field was isolated using rubber dam. Tooth surface disinfection was carried out before initiating treatment using 5.25 % sodium hypochlorite (Sodium hypochlorite, Ammdent, Mohali, India). Following tooth surface disinfection, bevel was given on tooth at fracture line and superficial 2 mm of pulp tissue was removed using sterile tapered round diamond bur in high speed hand piece with water coolant. Presence of bleeding while managing pulpal tissue had confirmed the vitality of the pulp. Hemostasis following the pulpotomy procedure was achieved using small cotton pellet damped in 3 % sodium hypochlorite (Parcan, Septodont, Maharashtra, India). Bleeding was controlled in 3 minutes time period following the pulpotomy procedure. Once hemostasis achieved, pulpal wound was irrigated using 3 % sodium hypochlorite. Subsequently, MTA (Dentsply, DeTrey GmbH, Konstanz, Germany) was placed upon the pulpal wound in the thickness of 2-3 millimetre. To ensure the setting of the MTA, moist cotton pellet of small size was placed upon MTA and tooth was temporarily restored using the intermediate restorative material. On the next day, second appointment was scheduled for the definitive restoration. Patient had considerable relief from the symptoms after the procedure. In second appointment, again rubber dam isolation was performed and intermediate restorative material and cotton pellet were removed. The setting of the MTA was confirmed and layer of reinforced glass ionomer cement(Ketac$^{TM}$ Molar, 3M Deutschland GmbH, Germany) was placed upon the MTA. Following this, tooth was restored using an aesthetic dental material of composite resin(Fusion, PrevestDenPro, Jammu, India) using etch and rinse technique. An immediate postoperative intraoral periapical radiograph was taken using standard exposure parameter to check for the adequacy of treatment and for the future comparison. Analgesic ibuprofen 400 mg was prescribed for the pain relief and patient was requested to take depending on the need.

**Outcome Assessment**

Patient was assessed for the relief from the symptoms one week after the intervention. Considerable relief from pain was reported within two days of procedure. Further follow ups comprising clinical and radiographic examination were scheduled at 6 months and 12 months for the evaluation of the success. Assessment of success was based upon the clinical as well as radiographic success (3). Clinically, treatment was considered successful since there was no presence of signs and symptoms related to pulpal and periapical disease, associated with treated tooth except for the initial days after the intervention. Radiographically, also the treatment was considered as successful, since there was no evidence of the pathosis such as periapical rarefaction or resorption. In present case report both clinical and radiographic success criteria were met.

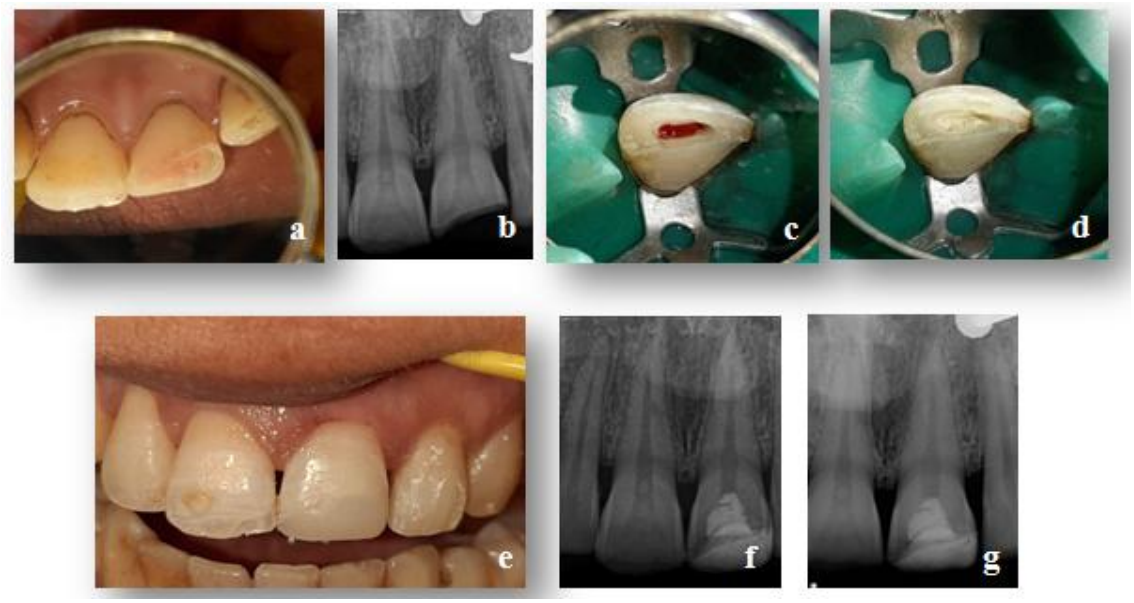


**Figure 1: Clinical procedure – a) Preoperative photograph b) Preoperative radiograph c) pulpotomy procedure d) MTA placement e) Postoperative photograph f) Postoperative radiograph g) 12 months follow up**

## DISCUSSION

Enhanced understanding regarding the biology of pulpal inflammation andadvancements in the pulp capping material has considerably changed the current trend of clinical practice (4). Recent evidences favours the use of vital pulp therapy as compared to the root canal treatment for the management of such cases. In recent times, emphasis on pulpal preservation and thereby preservation of its various functions has driven the clinical practice toward s the minimally invasive procedure.Cushley et al in recent systematic review has suggested complete pulpotomy as effective alternative to root canal treatment (5). On the other hand, Elmsmari et al, in recent metaanalysis emphasized more on the pulpal preservation based on the current understanding of the pulpal inflammation and suggested partial pulpotomy as an effective treatment modality for the management of teeth with reversible as well as irreversible pulpitis (6). In present case report, based on these all premises, we performed the pulpotomy using the mineral trioxide aggregate, which resulted in successful outcome up to one year follow up.

Although variety of factors affects the outcome related to the pulpotomy procedure, in broad term, strict isolation, aseptic precautions and the seal of the restoration are the major determining factors which may affect the outcome (6).In present case report, use of the rubber dam for effective isolation, consideration of the aseptic precaution with standard protocol of sterilization, surface disinfection using the sodium hypochlorite and effective dual layer seal of the restoration might have contributed to the successful outcome. Further, utilization of trisillicate based material as the pulpotomy agent might have contributed the adequate seal and the favourable condition for the pulpal wound to heal (7). Despite the consideration of all such factors attributing to the successful outcome, it is important here to mention about the regenerative potential of the dental pulp. Kakehashi et al has clearly demonstrated in the classic experimental study that bacterial infection is prime threat to the pulpal condition and pulp heals inevitably without and adverse consequences when favourable conditions are provided in germ free rats (8). Similarly, in present case report, it could be demonstrated that when adequate seal and favourable conditions were provided, complete relief from pain was obtained and also tooth was in a healthy state clinically as well as radiographically up to the follow up of one year.

While taking adequate care of the exposed pulp tissue in present case report, optimum restoration of the fractured tooth was another important aspect in the present (9). Since the tooth was in the aesthetically important zone, as a clinician it is important here to take careaesthetic considerations pertaining to the restoration along with the contacts, contour, form of restoration. Seal of the restoration and the harmony of the restoration with the adjacent hard and soft tissues were important parameters affecting the outcome. In present case report, dual layer of restoration was provided using the glass ionomer cement followed by the composite restoration in a manner which forms the harmony with adjacent hard and soft tissue.

Although, the present case report had resulted in successful outcome, it is important here to discuss regarding the limitation of the present case report. When MTA was used as a pulpotomy agent, it is associated with the risk of discoloration in long term follow up due to the presence of the bismuth oxide (10). In future case reports, clinicians can consider the utilization of the other trisilicate based material such as biodentine, bio aggregate for the management of such cases.

## CONCLUSION

Pulpotomy can be considered as aminimally invasive treatment modality for the management of complicated crown fracture with pulpal diagnosis of symptomatic irreversible pulpitis.

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