ORIGINAL RESEARCH PAPER

Paediatric Dentistry

PARTIAL PULPOTOMY OF AN IMMATURE ANTERIOR PERMANENT TOOTH WITH COMPLICATED CROWN FRACTURE: A CASE REPORT

KEY WORDS: Complicated Crown Fracture, Partial Pulpotomy, Mineral Trioxide Aggregate

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ABSTRACT

Traumatic dental injuries are highly prevalent among children. This case report describes a patient who has experienced dental trauma at 8.5 years old, which has led to enamel-dentine fracture with pulp exposure in the permanent left maxillary central incisor with immature roots. Partial pulpotomy using mineral trioxide aggregate (MTA) was performed with the aim of maintaining the neurovascular bundle, thus allowing normal radicular formation. Follow-up examinations revealed that the treatment preserved pulp vitality with continued root development and apex formation. This report demonstrates that the tooth with complicated crown fracture can be treated effectively by the described technique.

INTRODUCTION

The clinical and radiographic findings of dental injury due to trauma reveal a loss of tooth structure with pulpal exposure, which is commonly referred to in dental literature as complicated crown fracture.[1] Complicated crown fractures represent 18–20% of all traumatic injuries to permanent teeth.[2]. The majority of these injuries occur in recently erupted or young permanent teeth that have immature roots.[3] A crown fracture involving the pulp, if left untreated, will always result in pulp necrosis and subsequent periapical inflammatory changes. [5,6] Treatment and prognosis depend on several factors such as the time period between the incidence of fracture and initiation of treatment, the degree of root development, and the restorability of the tooth. [4,5,7] The treatment strategy of the crown fracture after pulp exposure is dictated by the concern for vitality of the dental pulp for continued root development of immature permanent teeth.[8] Pulp preservation by vital pulp therapy includes pulp capping and pulpotomy in complicated crown fractures of immature permanent incisors. Pulp capping is recommended for small exposure that occurred not more than a few hours previously. As the exposure site was large or the elapsed time was long between the accident and examination, partial pulpotomy was considered as the treatment of choice.[9]

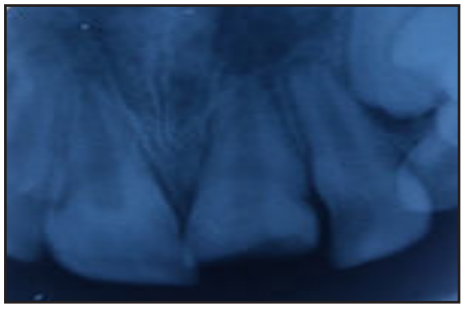
The aim of presenting this case report is to describe vital pulpotomy treatment with MTA in a complicated crown fracture of permanent immature anterior tooth with successful follow-up.

Case Report

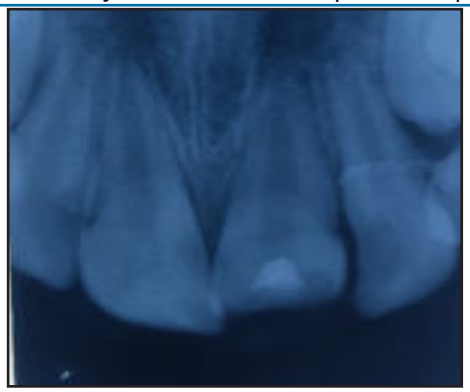
An 8.5-years-old male patient reported to the department of paediatric dentistry GDC Srinagar with a chief complaint of a trauma due to fall while playing that caused fracture in maxillary left central incisor (#21). His medical history was non-contributory and the clinical examination was performed 18 hours after the accident. Extraoral examination revealed no injury. Intraoral examination revealed a complicated crown fracture of the maxillary left central incisor tooth (Fig.1). The tooth was non-tender to percussion and not mobile and gave a vital pulpal response on electric pulp testing. The periapical radiographic image showed no apparent periapical pathosis, no evidence of alveolar bone or root fracture and the tooth showed incomplete root formation/open apex (Fig.2). Due to the open apex of the fractured tooth, it was decided to perform vital partial pulpotomy of maxillary left central incisor with MTA. Under local anaesthesia, the coronal pulp tissue was gently removed to a depth of 2 mm by using a high-speed sterile round diamond bur under water cooling. Haemorrhage was controlled with sterile cotton pellets and sterile saline solution to avoid clot formation. When pulpal bleeding stopped within 3 min, MTA powder was mixed with distilled water according to the recommended consistency and placed without any pressure to cover the exposed pulp. A moist cotton pellet was placed on the MTA and the cavity was sealed temporarily with glass ionomer cement (Fig.3). After 3 days, upper fractured central incisor was re-examined. As the tooth was asymptomatic to percussion sensitivity and gave vital response to electronic pulp test; the tooth was restored using an adhesive resin composite restoration and recalled after one week (Fig,4). After one week crown preparation was done in #21 followed by placement of acrylic crown (Fig.5a,5b).

Careful follow-up examinations were done at 2-month intervals in order to observe the root development of left maxillary central incisor (Fig.6). At the 8-month follow-up examination, no problems were detected and periapical radiograph showed that the apex of the maxillary left central incisor tooth was closed without any sign of pathology, and a dentine bridge was apparent at the pulpotomy site (Fig.7).

(Fig.1) Preoperative photograph showing a complicated crown fracture of the tooth 21



(Fig.2) Preoperative periapical radiographic view showing incomplete root formation.



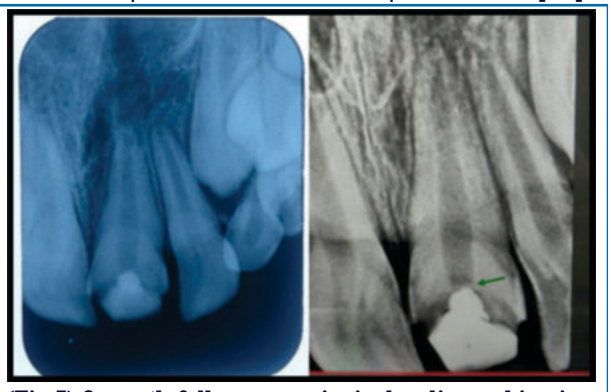
(Fig.3) Mineral trioxide aggregate (MTA) applied on the remaining pulp tissue.

Fig.4) clinical and periapical radiographic view after composite restoration

(Fig.5a) clinical and periapical radiographic view after crown preparation

(Fig.5b) clinical view after crown cementation

(Fig.6) 2-month follow up periapical radiographic view



(Fig.7) 8-month follow up periapical radiographic view showing apical root development with coronal dentin formation

DISCUSSION

In complicated crown fractures, preserving the vital dental pulp or part of it in a healthy state is the main objective in treating young permanent teeth.[15] Several studies had revealed that inflammation is confined to the surface 2–3 mm of the pulp when traumatically exposed and left untreated for up to 168 hours. [10-12] Therefore, it is universally accepted that vital techniques are recommended for immature teeth.[13]

Partial pulpotomy is a procedure in which the damaged and inflamed pulp tissue beneath an exposure is removed to a depth of about two millimetres to preserve the vitality of the remaining coronal and radicular pulp.[5] Cvek's vital pulpotomy technique has been used until 1983 with a calcium hydroxide mixture in order to initiate reparative dentin formation by controlling infection and stimulating the wound healing process.[9] In the past decade, mineral trioxide aggregate (MTA) became popular for maintaining the healing of the pulp tissues as it provides good sealing ability, biocompatibility, and low cytotoxicity and also induces odontoblast to form a hard barrier.[14-16]

The advantages of partial pulpotomy when compared with cervical pulpotomy lie in: the preservation of cell-rich coronal pulp tissue which provides a better healing potential; physiologic apposition of dentin in the cervical area is maintained (which is lost and dentinal walls weakened by cervical pulpotomy); a subsequent root canal treatment is not necessary; the natural colour and translucency of the tooth is preserved, and it is possible to perform sensitivity testing.[10]

In the present case, partial pulpotomy was performed using mineral trioxide aggregate (MTA). During follow-up, no clinical symptoms were observed, and in radiographs, it was possible to notice root development, with a visible dentin bridge formation and no peri radicular pathological changes.

CONCLUSION

Complicated crown fracture in an immature permanent maxillary anterior tooth can be treated effectively with partial pulpotomy using mineral trioxide aggregate (MTA). This treatment method preserves the pulp vitality with continued root development and apex formation.

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