



THE CLINICAL MANAGEMENT OF COMPLICATED CROWN ROOT FRACTURES: A CASE REPORT WITH LITERATURE REVIEW

Dental Science

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ABSTRACT

The treatment of complicated crown root fractures is always challenging in children and young adolescents. Though, different treatment approaches were proposed, the reattachment of the tooth fragment to a fractured tooth remains as the treatment of choice if the fractured segment is available or stored under proper conditions. The main advantages with reattachment technique includes simple in technique, aesthetics, and conservation of tooth structure. The fracture line below the gingival tissue, isolation conditions and storage of the fractured fragment determines the clinical success of the complicated crown root fractures. This report presents a case of complicated crown-root fracture of permanent maxillary left central incisor, in a eleven year old boy. The traumatised tooth was treated by regular root canal treatment, followed by post and core and reattachment of the fractured tooth fragment.

KEYWORDS

Dental trauma, Complicated crown root fractures, Tooth fragment reattachment

Introduction:

The incidence of traumatic dental injuries is increasing over the period of years and the magnitude of this problem is substantiated by statistical data which indicates that 6% to 34% of individuals suffer during childhood or adolescence [1]. The incidence of these injuries has increased during the last ten to twenty years and suggest that the incidence of dental trauma will soon exceed that of dental caries and periodontal diseases [2]. Crown fractures of permanent incisors account 18 - 22% of all trauma to dental hard tissues, 28 - 44% being uncomplicated crown fractures and 11 - 15% complicated crown root fractures [3]. Traumatized anterior teeth require quick functional and esthetic repair in case of young patients as it not only causes physiologic impairment, but also esthetic disfigurement leading to a psychological impact.[4]

The most common etiological factors of crown and crown root fractures in the permanent dentition are injuries caused by fall accidents, sports injuries, road traffic accidents, and foreign body impacting the teeth [3,4]. The face and the teeth being the most exposed parts of the body have a higher tendency to fracture. It is also known that the most frequently affected teeth are the maxillary incisors, increased overjet and insufficient lip coverage are reported as significant predisposing factors [4].

The different techniques to restore the fractured anterior crowns include jacket crown, orthodontic bands, pin retained resin, porcelain bonded crown and composite resin [5]. Tooth fragment reattachment have shown to be an acceptable solution for the restoration of the fractured anterior tooth [6]. The present article reports a case of complex crown root fracture and reviews the different treatment modalities for complex crown root fractures.

Case report:

A 10 year old male patient reported to the Department of Pedodontics and Preventive Dentistry with fractured maxillary anterior tooth. The parent of the child gives history of fractured teeth 3 hours ago while playing in the ground. The child gives history of severe pain in the upper front teeth since the history of trauma. The extra oral examination revealed no significant findings. The intra oral examination revealed a fractured teeth in relation to #11, #21, and #22. The fractured segment of the crown portion was still attached to the tooth in relation to #21. The fractured tooth #21 shows the crown fracture involving the pulp and the fracture line extends below the gingival line on the lingual side [Figure 1A]. The intra oral radiographs were advised and pulp testing was advised in relation to #11, and #22. The radiographic findings revealed no root fractures in relation to #21. The pulp testing shows vital pulps in relation to #11 and #22. As the tooth fragment was attached to the tooth structure and patient was reported immediately after trauma, tooth fragment reattachment followed by Post and core preparation was planned in relation to #21 and composite restorations were advised for #11 and #22.

The tooth fragment was removed from the tooth structure under local anaesthesia (Lignocaine 1: 200000 concentration) [Figure 1B] and stored in the normal saline. The regular single sitting root canal treatment was completed for tooth irt #21 [Figure 2A]. The HiRem post size 2 (Overfibers, Italy) was selected for post and core preparation. A post space preparation was done leaving a 5 mm of gutta percha in the root canal [Figure 2B]. After the proper adaptation of the post in the root canal was checked, it was trimmed such that about 2 mm of post was beyond the tooth structure [Figure 3A]. An opening was created on the lingual surface of the fractured tooth fragment such that it creates a vent for proper seating of the post in the root canal space.

The muco-periosteal flap was raised on the lingual surface of the tooth #11, #21, #22 and the fracture line was observed and isolated properly for bonding of the fractured tooth fragment. The fractured tooth fragment was reattached to the tooth structure with flowable composite (Filtek Z 250 XT, 3M ESPE) [Figure 3B]. The selected post was adapted in the root canal and luted using resin based luting cement, Calibra (Dentsply, U.K.). The fracture line on the buccal surface was camouflaged with shade matching composite resin. The regular composite resin restorations were completed for tooth in relation to #11 and #22 [Figure 3B]. The patient was given oral hygiene instructions and was recalled for follow-up after 6 weeks for evaluation and review.

Discussion:

Management of complicated crown-root fractures always remains a challenge in children and adults as well. The difficulty in achieving isolation with a rubber dam for a dry operating field, which in turn compromise the hermetic seal of final restoration remains the major challenge while treating the complicated crown root fractures [7].

The various fractures determine the treatment plan and prognosis for complicated crown root fractures which includes the fracture extent below the gingival, pulpal involvement, periodontal status, tooth maturity, biological width considerations, alveolar bone fracture, restorability of fractured tooth fragment, secondary traumatic injuries, and the adaptation between the fractured tooth fragment and remaining tooth, aesthetics, and financial considerations. [8]

The different treatment modalities have been proposed for crown-root fractures in the literature. The removal of fractured coronal fragment followed by the root canal treatment and reattachment of the fractured fragment. The storage conditions of fractured segment remains the important factor for successful restoration. The second treatment option is to convert the subgingival fracture to a supragingival fracture with the aid of gingivectomy and osteotomy treatment procedures. The third treatment option is removal of the coronal fragment and followed by the surgical extrusion of the tooth, in order to surgically move the

fracture line from sub-gingival position to a supra-gingival position. The fourth treatment modality is removal of the coronal fragment and subsequent orthodontic extrusion of the tooth. However, the long duration of treatment and patient compliance need to be considered [1].

Tooth fragment reattachment offers the advantage of being simple to operate, time saving, and conservative technique [1,6]. Reattachment technique also provides natural aesthetics in terms of color, tooth morphology, and translucency match. [9] However, the appropriate storage conditions of the fractured fragment or the presence of intact fractured fragment indicates this treatment option [10]. As the fractured tooth fragment was attached to the tooth in the case described above, use of natural tooth substance as restorative material was selected as the treatment of choice [9,11].

Hegde SG et al., have reported a similar case of reattachment coronal tooth fragment with the fibre post and the case was followed for four years and concluded that reattachment is the most economical, biologically acceptable and aesthetic restorative option for dental trauma for anterior teeth [12]. Kulkarni VK et al., have also presented a case report where, reattachment technique was used to treat a vertically fractured tooth in a developing child. They reported that the orthodontic extrusion followed by gingivectomy aids in successful reattachment procedure. [13] However, no such orthodontic extrusion was used in the case report presented above, as the fracture line was extending only up to the coronal third of the root. Similarly, Chaugule V et al., presented a case report of vertically fractured central incisor treated with the reattachment technique and concluded that over a period of six months showed no clinical or radiographic abnormality. However, they suggested the long term clinical studies to evaluate the success of reattachment techniques in the complicated crown root fractures. [14]

The six week follow up of the above presented case showed no clinical or radiographic abnormality. However, the above couldn't be followed for long term as the child was shifted to the other place because of educational reasons. Thus, the authors recommend the good quality clinical trials or the case series with long term follow up for concluding the success of reattachment technique in complicated crown root fractures.

Conclusion:

The reattachment technique for the complicated crown root fractures is an efficient alternative to the invasive and costly treatments for the anterior teeth fractures. The extra oral dry time of the fractured segment, the level of sub gingival fracture line, patient compliance in young children determines the success of reattachment technique in the treatment of complicated crown root fractures.

Figures:

Figure 1: The Pre operative clinical photographs



A - The fractured segment attached to the tooth; B - Extracted fractured tooth fragment.

Figure 2: Root canal treatment and Post space preparation



A - Root canal treated tooth irt #21; B - Post space prepared irt #21

Figure 3: Post adaptation and reattachment of the fragment



A - Fibre post extending 2 mm below the fracture line; B - Reattached fractured tooth fragment.

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