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Reattachment of a Complicated Crown Root Fracture with 2 years CBCT follow up-A Conservative Approach

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Abstract: *Dentoalveolar trauma is usually common in people belonging to the age group of 6-13 years, and can result from either traffic accident, contact sports or accidental fall. Maxillary anterior teeth are commonly affected leading to problems in esthetics, function and speech of the patient. A crown root fracture (CRF) is a type of dental trauma, which involves enamel, dentin, and cementum. It generally occurs below the gingival margin and depending on the involvement of pulp, can be classified as complicated or uncomplicated . The development of improved adhesive materials has given a new approach in the management of fractured teeth. In cases where the fractured fragment is available reattachment is the most immediate, economical and conservative treatment option available. The first factor to be considered while formulating the treatment plan for a traumatic fracture is whether the tooth/teeth can be salvaged. In case the fracture line extends too apical, compromising the crown-root ratio, extraction of the tooth and replacement with an appropriate prosthesis is recommended .*

This case report aimed to describe the two year follow-up data of a patient who underwent tooth fragment reattachment on the maxillary lateral incisor after crown-root fracture with pulp exposure as well as the steps followed for functional and esthetic adjustments.

Key words*:- Fragment reattachment, prefabricated fiber post, complicated crown-root fracture*

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I. Introduction

Anterior tooth fracture is an agonizing experience which requires immediate attention, because it will impact function and esthetics of the patient. Impact of trauma on tooth varies from a simple chipping of enamel to complex crown root fractures. A crown-root fracture involves enamel, dentin and cementum. Fractures can be classified as complicated (involving pulp) and uncomplicated (not involving pulp). Common etiologic factors are injuries caused by falls, foreign bodies striking the teeth and automobile accidents [1]. Restoring esthetics and function remains the primary goal of treatment. Several therapeutic approaches are available for fractured anterior teeth. However, when the fragment is available, reattachment of the fragment is an exquisite way to rehabilitate the dentition. The objective of this case report is to describe a biological restorative approach for treating a left maxillary lateral incisor with complicated crown-root fracture.

II. Case Report

A 28 year-old male patient presented in the OPD of Research and Referral Army hospital with the chief complaint of pain in a broken front tooth due to accident an hour before. Extraoral examination revealed lacerations on left upper cheek and infraorbital region. The patient's history for systemic diseases or allergy was non-contributory. Intra oral examination revealed that there was complicated crown root fracture with respect to left lateral incisor (22), with the fracture line running obliquely from the gingival third of the tooth on the labial aspect to subgingival palatally (Figure 1,2). Periapical radiographic examination revealed complete root development, closed apices, no periapical pathology, and absence of any bone fracture (Figure 3). Tooth was tender on percussion. Patient reported while carrying detached tooth fragment of 22 (Figure 4). There was fracture of incisal third with respect to left central incisor(21) (Figure 5). There was no intraoral soft tissue injury or swelling. As the patient was mainly concerned about esthetics and wanted immediate rehabilitation of form and function, reattachment of fractured fragment was planned. Complete pulp tissue was removed and fragment was stored in saline. Working length was determined and cleaning and shaping was done by crown down technique, followed by obturation of the canals with gutta-percha (Dentsply Maillefer, Ballaigues, Switzerland) and resin-based sealer (AH Plus, Dentsply, Konstanz, Germanyusing the lateral compaction

technique (Figure 6,7). After that post space preparation was done and glass-fibre-reinforced composite root canal post (Easypost, Dentsply Maillefer) was checked for proper seating (Figure 8,9). An internal dentinal groove was prepared in the detached fragment to accommodate the head of the post. Palatal flap was raised to expose the fracture line (Figure 10). Both the fragment and tooth were etched with 37% phosphoric acid (3M Scotchbond™) followed by universal adhesive bond (3M ESPE Single bond universal adhesive) application for 20 s and light cured (Blue Phase G2 light cure unit) for 20 s. Dual cure (G CEM Link Ace GC) resin cement was used as per the manufacturer's instructions for luting the post and detached fragments together (Figure 11). After final curing excess cement was removed, surface was finished with yellow line diamond bur and flap sutured back (Figure 12). Contact was relieved in all the protrusive, lateral movements and tooth was allowed to have protected occlusion. Post-operative instructions were given. Patient was recalled after a week for suture removal(Figure 13) and final polishing of the surface with the help of polishing discs(Sof-Lex,3M, USA) was done. Clinically patient had no pain, no periodontal pocket, tooth was firm and not mobile.

Patient was kept on follow ups of 3 months for a year. After 12 months of follow up periapical radiographic examination didn't reveal any abnormality (Figure 14). CBCT was taken which showed complete approximation of fractured segments with no bone loss either in the crestal or in the periapical area (Figure 15). To further increase the longevity of the tooth, All Ceramic lithium disilicate crown w.r.t to 22 was planned. Tooth preparation was done and a temporary crown was given (Figure 16,17). Then after a week permanent crown was bonded with resin cement (Figure 18). Composite build up of left central incisor was done to replace the fractured incisal edge (Figure 19). Patient was recalled and IOPA radiograph was taken after 2 years of follow up which showed no periapical or periodontal abnormality(Figure 20).

III. Discussion

Anterior tooth trauma in addition to pain and discomfort, has an impact on psychological wellbeing of a patient. Amongst the various treatment options available composite restorations can be considered only for less extensive fractures in enamel and dentin. Post and core supported crowns are recommended in cases where the remaining tooth structure is not sufficient and the fractured tooth fragment is not available. With the fracture line extending below the alveolar crest, orthodontic extrusion or surgical extrusion is recommended before the restoration. But when the fractured tooth fragment is available reattachment is considered to be a more expedient option [2].

Tennery was the first one to perform the reattachment of a fractured fragment using the acid-etch technique [3]. Subsequently, Starkey and Simonsen came up with similar cases [4].

Despite of the ever-increasing popularity of self-etch bonding agents, total etch adhesive system still represent the gold standard of reliable and strong enamel bonding [5]. In the above mentioned case, the fracture was complicated crown root fracture i.e. fracture of the crown root with pulpal involvement. Endodontic therapy helps to relieve the pain and provide space for post placement. Various materials such as light cured GIC, composite, dual cure resin, self adhesive resin cement can be used for reattachment purpose. In the present case the fracture line extended subgingivally at the palatal aspect. However, as the fracture was supraalveolar, sufficient access was achieved by raising a palatal flap. Though various studies have inferred that posts do not strengthen endodontically treated teeth, but in the present case their use is justified to reattach the fractured coronal fragment [6].The common complications of post and core are debonding and root fracture. These are more common in cast metal post cases due to wedging forces resulting in fracture of an already weakened root. In the above mentioned case fiber reinforced post was used which has similar modulus of elasticity to that of resin cement and dentin which increases the retention by providing monoblock effect. It produces a multilayered structure with no inherent weak interfaces, thus reinforcing the tooth structure. The technique of reattachment which does not include any modification of the remaining tooth or tooth fragment is called simple reattachment [7]. However, some authors advocate preparation of the tooth surfaces prior to bonding. The preparation techniques can be external chamfering, overcontouring or internal dentinal groove which helps to obtain optimal esthetics, retention, and function [7,8]. In this case, an internal dentinal groove was prepared on the coronal fragment to provide a higher mechanical strength and longevity.

Assessment of occlusion after reattachment is essential as occlusal forces generated can be extremely destructive to the tooth fragment – bonding agent interface [9]. The possible afterwards complications include discoloration of the attached fragment and failure of bond due to new trauma. Regular follow-up is necessary.

IV. Conclusion

Tooth fragment reattachment procedure offers an immediate, fast, economical and esthetically pleasing result when the fractured fragment is available. It gives sense of mental well being to the patient satisfying the patient psychologically.

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Figures

Figure 1) Intra oral picture showing complicated crown root fracture with respect to left lateral incisor 22.

Figure 2) Intra oral picture revealing fracture line running obliquely from the gingival third of the tooth on the labial aspect to subgingival palatally

Figure 3) Periapical radiograph showing complete root development, no periapical pathology and absence of any bone fracture

Figure 4) Detached tooth fragment of 22

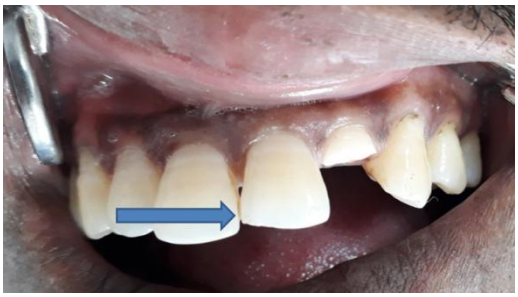

Figure 5) Intra oral picture showing fractured incisal third of 21

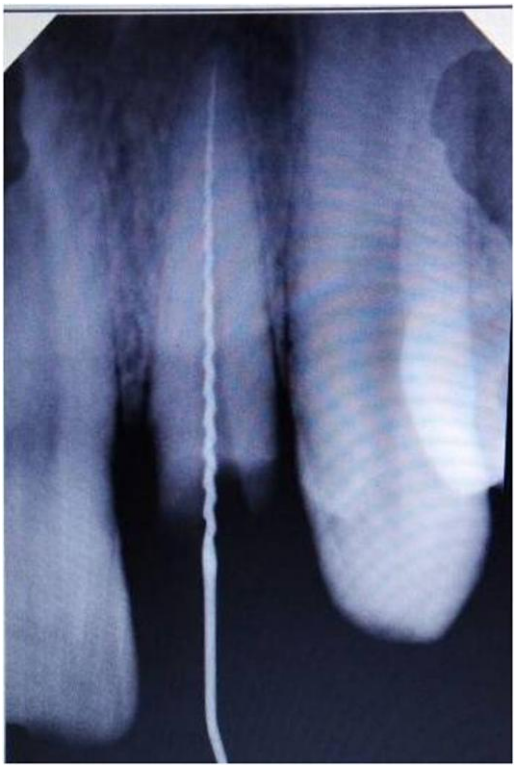

Figure 6) Working length determined

Figure 7) Master cone radiograph taken

Figure 8) After post space preparation

Figure 9) Post checked was for proper seating

Figure 10) Raised palatal flap exposing the fracture line

Figure 11) Radiograph after luting of post and detached fragments together

Figure 12) Intraoral picture after sutures and finishing of surface

Figure 13) After removal of sutures

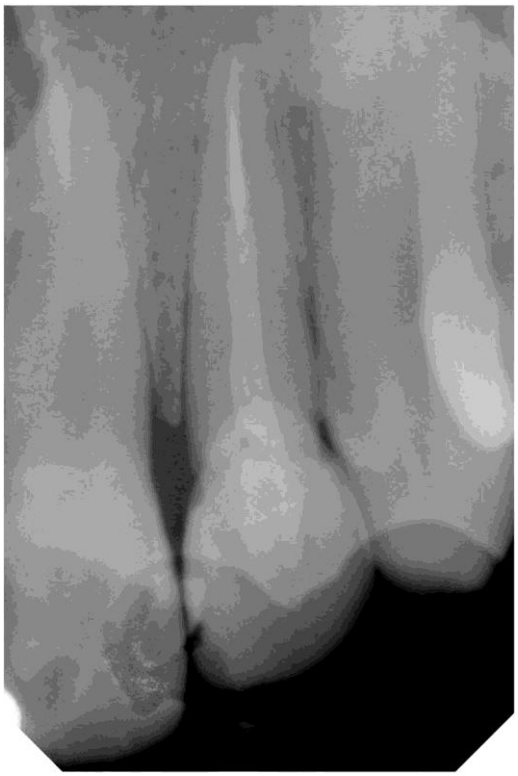

Figure 14) Periapical radiograph after 12 months of follow up not showing any abnormality

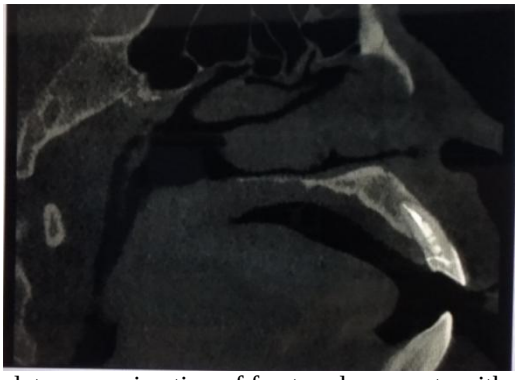

Figure 15) CBCT showing complete approximation of fractured segments with no bone loss either in the crestal or in the periapical area

Figure 16) After preparation of tooth to receive crown

Figure 17) After temporary crown cementation

Figure 18) Permanent crown bonded with resin cement

Figure 19) Composite build up of left central incisor to replace the fractured incisal edge

Figure 20) IOPA radiograph showing no periapical and periodontal abnormality after 2 years of follow up

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