Case report:

The Treatment Strategy of an Oblique Complicated Crown-Root Fracture in A Single Visit: A Case Report

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ABSTRACT

Traumatic dental injuries commonly occur among children and adolescents, as the most commonly affected teeth are maxillary central incisor. Complicated crown-root fractures are particularly challenging for aesthetic and functional rehabilitation and often require a critical care. A 31-year-old male patient came to the Department of conservative dentistry and endodontics attributed to fractured maxillary incisors caused by trauma during an outdoor game activity. Clinical examination revealed horizontal fractures of teeth 7, 8, and 9 extending subgingivally on the buccal and palatal side, with complication of pulpal exposure. Root canal treatment was performed, definitive repositioning was accomplished by raising a full thickness gingival flap and by insertion of fiber-reinforced compoite posts. Reattachment was accomplished under surgical conditions to ensure precise positioning of fragments by exposing the buccal and palatal aspect of the fracture lines to provide a dry operating field and splinting the fragments after that. Definitive composite resin build-up of angle fracture was performed after seven days.

Key words- Complicated crown root fracture, Mouth guard, Reattachment, Traumatic Dental Injury

INTRODUCTION:-

The etiology of traumatic dental injuries (TDIs) are mainly intentional and unintentional, furthermore divided in to oral, environmental, and human factors.[1] According to studies, 13% to 39% of all dental injuries are sports affiliated, with males traumatized doubly as usually as females. The prominent position of upper central incisors within the dental arch makes them the foremost often traumatized teeth in each primary and permanent dentition. [2,3] A study by Kumamoto[5] showed that the highest incidence of orofacial injuries created during sports activities was observed in athletes of basketball, baseball, and unorganized football, when they played without wearing mouthguards. TDIs have a great influence on patient's quality of life since they cause aesthetic, functional, and phonetic problems. Psychosocial aspects of the patient are peculiarly noticed if the fractured teeth are visible. Therefore, usually TDIs require critical care by the patient and the dentist to achieve the inimitable treatment option in the least traumatic way. Complete rehabilitation of traumatized teeth often demonstrates a requirement of multidisciplinary approach. Crown-root fractures include enamel, dentin, and cementum; and may present below the gingival margin; & differentiated as complicated and uncomplicated depending upon the pulp tissue involvement.[1] The unstable position of the fractured

coronal fragment, loss of tooth vitality, invasion of biological width, and problems fitting fragments together make definitive restorations of crown-root fractures demanding and problemetic.[6,7] The management of dental trauma has to be planned carefully, including in depth history of the patient and careful clinical and radiologic examination. The correct diagnosis and most suitable treatment options for the patient include factors such as the type, direction, and extremity of the trauma; encroachment of the pulp tissue or biological width; level of root growth; mobility of the tooth; diastasis of the fragments; and the knowledge and expertise of the dentist.[8,9] The present clinical report describes the management of complicated crown-root fractures, including endodontic treatment, surgically raising a full thickness gingival flap, adhesive reattachment of fragments using fiber-reinforced composite posts and aesthetic build-up of fractured fragment.

DESCRIPTION OF TECHNIQUE :

A 31 -year-old male patient was referred to the Government Dental College and Hospital, Ahmedabad due to intense pain of fractured teeth caused by trauma during a football game the day before. A maxillofacial surgeon screened the patient, carried out debridement of the wounds, concluded that there have been no fractures to the facial bones, prescribed antibiotic therapy, and referred the patient to the Department of Conservative Dentistry and Endodontics.

Clinical investigations revealed horizontal fractures of the maxillary right lateral incisor and both maxillary central incisors, labially in the cervical third and extending subgingivally on the buccal and palatal side, with exposed pulp tissue (Figure 1: A). The crown fragments were extremely mobile however still in situ, fixed slightly on the palatal side by periodontal ligament fibers, while the root fragments were stationary and stable. Adjacent teeth had no sign of trauma. Radiographs confirmed the presence of horizontal fractures for teeth 7, 8, and 9 (Figure 1: B). On presenting all treatment options, to include both risks and benefits, the patient opted for reattachment of the fragments using glass fiber posts under surgical conditions. At first, the crown fragments were gently separated from the periodontal tissue and cleaned, then fragments were kept saline solution to keep them moist and prevent desiccation (Figure 1: C, D, E). Root canal treatment was commenced in radicular portion. On cleaning and shaping (ProTaper Next, Dentsply,Maillefer, Switzerland), definitive obturation was performed using gutta-percha points and AH plus sealer (Dentsply DeTrey, Konstanz,Germany) (Figure 1: F,G). The post space was prepared using a Peeso Reamer No. 3, up to an adequate length (Figure 1: H). Considering that the fracture lines on the palatal aspect were deeply subgingival, definitive repositioning of fragments was performed after raising a full-thickness gingival flap. The full thickness flap was elevated from the canine to the canine both buccally and palatally. Two releasing incision were given on buccal side with envelope flap palatally (Figure 2: J). The subgingival palatal fracture lines were exposed in this manner to control bleeding and ensure precise fragment repositioning (Figure 1: I). The pulp chamber cavities were extended to ensure a straight-line passage of posts (Figure 1: I). The fragments were fitted once more to ensure adaptation. The canal spaces and surrounding tooth issue, as well as the crown fragments, were etched for 15 seconds, rinsed with distilled water, and dried completely to be prepared for the reattachment procedures. Primer A and primer B mixture (Multilink, Ivoclar Vivadent AG, Schaan, Liechtenstein) was applied into the canal and the surfaces of the fractured

fragments and gently dried, followed by application of monobond plus Multilink, Ivoclar Vivadent AG, Schaan, Liechtenstein) on the fiber post. Resin cement (Multilink, Ivoclar Vivadent AG, Schaan, Liechtenstein) was placed in the canal, on the fiber post (Reforpost, Angelus Brazil) and inside the pulp chamber space of fractured fragments. The post was set and stabilized, the crown fragment was repositioned, and then whole assembly was light cured for 40 seconds from every side (Radii Plus, SDI, Bayswater, Australia). Repetition of same procedure was done on the adjacent teeth. A dry operating field was maintained by Sterile gauze piece. At the end of the reattachment procedure, the flap was repositioned, fixed, and suture was taken using black-silk suture 3-0 (Ethicon, Inc. Somerville, NJ) (Figure 2: K, L). The fragments were temporarily repositioned and splinting was carried out using a composite-resin splint, from teeth 6 to 11, to stabilize the position of the teeth. (Figure 2: N, M). The patient was instructed on the significance of maintaining adequate oral hygiene, application of precautions, and the needfulness of using a mouthguard during sports activity. After 7 days' sutures and splinting were removed and composite (Tetric n ceram, Ivoclar Vivadent AG, Schaan, Liechtenstein) build-up of angle fracture was done in 9. The patient had no complaints at1 month and 3 months' follow-up examinations. (Figure 2: O, P, Q, R)

DISCUSSION:

The aesthetic, functional, and biological rehabilitation of traumatic injured teeth is a real challenge for every clinician, often requiring an interdisciplinary approach. Various treatment modalities have been considered for crown-root fractures: coronal fragment extraction followed by prosthetic restoration, fragment reattachment, gingivectomy and osteotomy (crown lengthening), orthodontic extrusion of a remaining root fragment, forced surgical extrusion from the socket, and extraction of a tooth followed by implants or fixed partial denture.[10,11] Simple and short treatment, that provides natural-looking aesthetic appearance, and that ensure long-term success rates are usually preferred.[12] The reattachment procedure is not convenient whenever the fracture line is positioned subgingivally, a dry operating field is challenging to achieve which is necessary for reattachment, and the whole treatment can be finished unsuccessfully. Therefore, the reattachment procedures in the present case were implemented after raising a full-thickness gingival flap, under surgical environment, to expose the fracture line, control bleeding, and ensure the precise sitting of fragments to an original position. Periodontal structures should be conserved as much as possible; therefore, repositioning must be done gently and atraumatically to provide desirable wound healing and admissible biological restorations. Various complications such as gingival inflammation, clinical attachment loss, and bone loss are frequent, especially in patients who do not comply with instructions given by the dentist.[1,13] Treatments of choice for converting subgingival fractures into supragingival one, include some of the following treatment options. Gingivectomy and osteotomy (crown lengthening) are relatively simple and quick procedures, but usually not indicated in aesthetic areas.[14-16] Orthodontic extrusion is favourable for maintaining periodontal health and maintain the crown-root ratio, but the procedure is time taking, demanding five weeks to achieve 2-3 mm of extrusion and a retention phase of about 8-10 weeks.[11,14,17] Surgical extrusion of the tooth is a less time needing procedure, but chances are there of root resorption and compromising the integrity of the periodontal ligament.[14] During the reattachment procedure, separated fragments must

be kept out of the mouth for as little time as possible so that they can remain moist and prevent dehydration; in this way, they maintain an adequate bond strength and their original aesthetic appearance.[18] In the present case, the fractured fragments were preserved in a saline solution until reattachment, which was necessary to prepare and set the posts. Advances in the development of adhesive materials and restorative techniques have made the selection of reattachment procedure the most preferred treatment option for tooth fracture. Also, whenever the coronal tooth fragment is intact and available and precise repositioning between fragments is possible. Although technically sensitive, the reattachment procedure has significant advantages: because of the conservative approach and a quick procedure, it instantly restores the natural appearance and function of the tooth, and it results in positive emotional and social feedback from the patient.[7,9] Aesthetic glass fiber posts were used to fix the tooth fragments, enhance retention, and strengthen the remaining tooth structure. Glass fiber impregnated resin posts were chosen to reinforce the fractured teeth due to their excellent aesthetics, ability to bond to tooth structure, stiffness, and elasticity similar to dentin, high durability, and fracture resistance.[19,20]. The clinician should assess the potential treatment of each trauma case on an individual basis. However, because the findings of few long-term studies related to fragment reattachment have been reported in the literature, the patient should be informed that the treatment may be only of an interim nature. So, frequent follow up should be taken in such cases.

CONCLUSION:

The present clinical report describes the successful therapeutic treatment of complicated crown-root fractures and demonstrates the various ways of maintaining natural teeth during the therapy of traumatized teeth.

A- PREOPERATIVE PHOTOGRAPH
B- PREOPERATIVE RADIOGRAPH
C- AFTER EXTRACTION OF FRACTURED CORONAL FRAGMENT
D- AFTER EXTRACTION OF FRACTURED CORONAL FRAGMENT
E- FRACTURED CORONAL FRAGMENT
F- WORKING LENGTH DETERMINATION
G- SECTIONAL OBTURATION OF RADICULAR PORTION
H- FIBER POST FITTING CHECK UP
I- ACCESS CAVITY REDEFINED IN CORONAL FRACTURED FRAGMENT

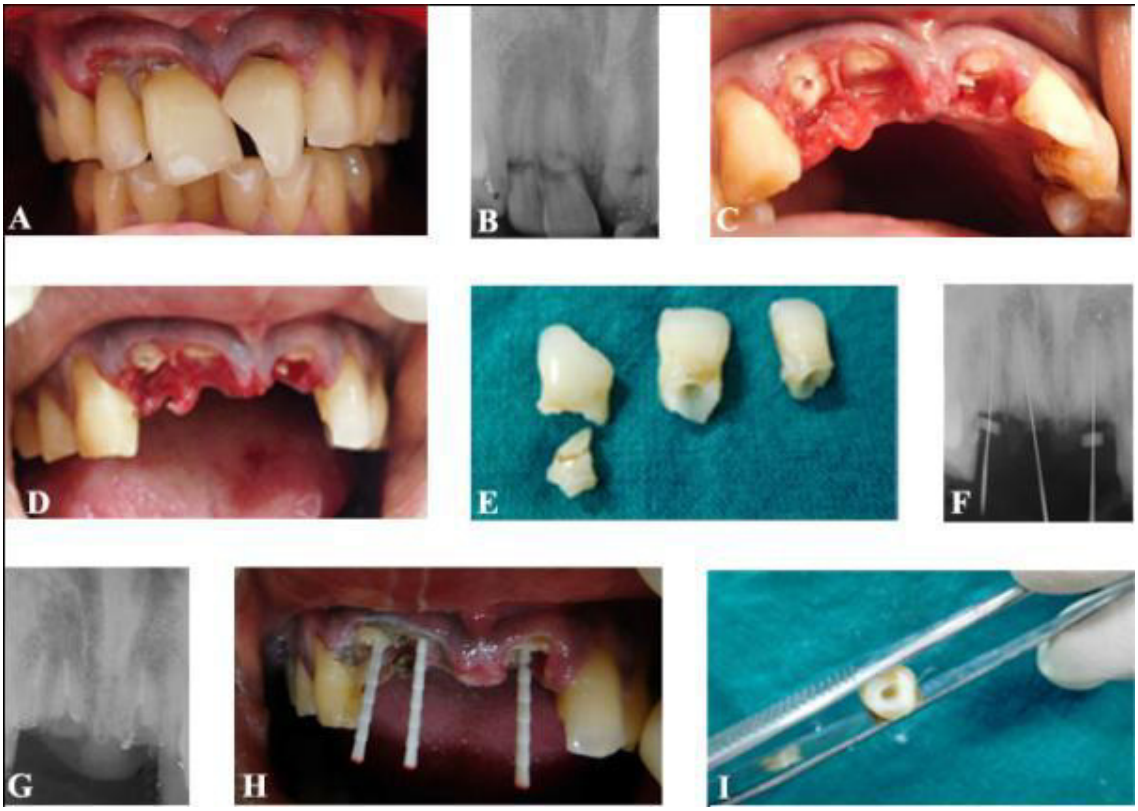

FIGURE 2

J-FULL THICKNESS FLAP REFLECTION

K-SUTURE PLACEMENT

L- IMMEDIATE POST OPERATIVE

M-AFTER SPLINTING

N-RADIOGRAPH AFTER SPLINTING

O, P- 1 MONTH FOLOOW UP

Q , R – 3 MONTHS FOLLOW UP

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