IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 7 Ver. II (July. 2015), PP 25-29
www.iosrjournals.org

Complicated Tooth Fracture Management by Intraradicular Stabilization with FRC Post System – A Case Report

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Abstract: *Traumatic injuries resulting in fracture of dental hard tissues are unforeseen events that can produce major psychological impact on patients. Immediate management which restores the teeth to aesthetics and function is the norm whenever feasible. In anterior teeth, complicated crown-root fractures extending subgingivally usually require tooth extraction. This case report is of a young female patient with complicated crown root fracture in the mesio-distal plane which was managed by re-attachment of the fractured segments by intraradicular stabilization with fiber reinforced composite post in a single visit.*

Keywords – *Biological width, crown-root fracture, monoblock effect, re-attachment, vertical root fracture.*

I. INTRODUCTION

Traumatic injuries to anterior teeth are devastating and have a major psychological impact on the patients. These result in damage to the teeth and periradicular tissues, making the management and consequence of these injuries multifactorial. It can either involve the crown, root or both. Crown root fractures involve enamel, dentin and cementum and are classified as complicated or uncomplicated according to the presence or absence of pulpal involvement respectively. It comprises 5% of traumatic injuries affecting permanent dentition and 2% in the primary dentition [1]. Various factors influence the management and outcome of tooth fractures like the extent and pattern of tooth fracture, restorability of tooth, secondary injuries, the remaining tooth structure, occlusion, aesthetics, finances and overall prognosis.

Vertical fracture of crown root running along the long axis of the tooth or deviating in a mesial or distal aspect is a rare type of dental injury. When a vertical tooth fracture extends below the gingival attachment the recommended treatment has been extraction. But according to long term case studies, a fractured tooth can be salvaged and can remain intact and fully healthy, when repositioned early and stabilized [2]. Teeth which were considered unrestorable in the past can now be restored to aesthetics and function due to the major advents in adhesive dentistry.

This case report is about a young female patient with complicated crown-root fracture, which was managed by intraradicular stabilization of the fractures segments using glass fiber post. The treatment was planned giving prime importance to the patient's aesthetic concern and age which warranted an immediate management.

II. Case Report

A 23 year old female patient reported with complaint of pain in relation to broken upper front tooth (Fig 1). She gave history of being accidently hit by umbrella on the previous day. She was advised extraction of the involved teeth from a private clinic but was not willing for extraction.

On examination, extra orally there were abrasions on upper and lower lip. Intra orally, Ellis class III fracture of upper right central incisor was noted. There was also vertical fracture of the crown extending subgingivally, with the fracture line running mesiodistally splitting the crown into labial and palatal halves (Fig 2). There was significant mobility of the palatal segment and pulp was protruding from the fractured tooth. Ellis Class I fracture of lower right lateral incisor was also noted.

Radiographic examination of upper right central incisor showed complicated crown root fracture extending obliquely from cervical third of crown on the distal aspect to the mid root region on the mesial aspect approximately 6mm apical to the crest of the bone (Fig 3). Intraoral Periapical Radiograph of lower right lateral incisor showed enamel fracture.

III. Treatment Plan

Considering the aesthetic concern of the patient, the entire treatment was planned as a single visit procedure to re-establish aesthetics and function. In addition to achieving isolation, the rubber dam clamp functioned to stabilize the fragments till the completion of the procedure. Root canal treatment of upper right central incisor was planned; followed by stabilization of the fractured crown and root segments using fiber reinforced composite post and resin cement. Composite restoration of lower right lateral incisor was also planned.

IV. Procedure

Local anaesthesia was administered and rubber dam isolation done. After placement of rubber dam clamp, stabilisation and approximation of the fractured segments were achieved. Access opening was done and working length was determined using Raypex 5 apex locator (Dentsply) and confirmed by radiograph (Fig 4). Biomechanical preparation was done till apical size 55 k- file. Canal was dried and there was no bleeding or any discharge into the canal space from the fracture site.

Sectional obturation was done with C-Fill obturation system and AH 26 sealer (Dentsply) to achieve an apical seal of 5mm of gutta-percha (Fig 5).

Fiber reinforced composite post (Coltene Whaledent) was etched, bonding agent applied and cured extra orally. Canal was also etched, rinsed and dried with paper points. Bonding agent was then applied (prime & bond NT) inside the canal (Fig 6). The glass fiber post was then luted into the canal using resin cement (Calibra) and the crown build up was done with composite resin (Filtek Z 350, 3M ESPE);(Fig 7). Composite restoration of lower right lateral incisor was also done. Antibiotics and analgesics were prescribed and chlorhexidine mouth rinse was also advised.

Patient was recalled on the next day for evaluation and full crown was planned. Patient was asymptomatic and the tooth was stable and periodontium was healthy on recall after 2 weeks. Tooth preparation was then done (Fig 8) and metal free ceramic crown (IPS e-max) was given. Six month follow up of the patient was done and patient remained symptom free during this period (Fig 9).

V. Figures

Figure-1 Pre-operative photograph - Labial view

Figure-2 Pre-operative Photograph - Palatal view

Figure-3 Pre-operative Radiograph

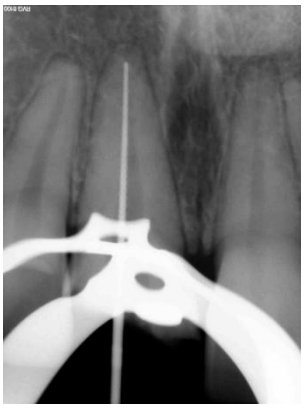

Figure-4 Working Length Radiograph

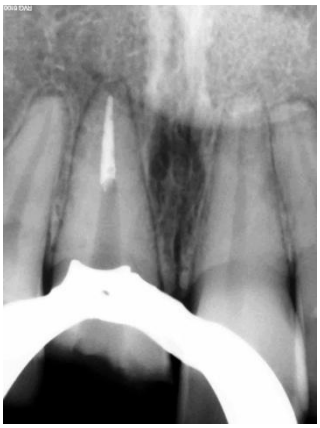

Figure-5 Sectional Obturation

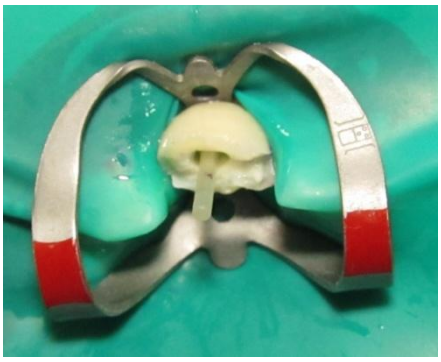

Figure-6 Fiber Post Try-in

Figure-7 Composite Build-up

Figure-8 Tooth preparation

Figure-9 Post-operative Photograph

VI. Discussion

Vertical fracture of crown root running along the long axis of the tooth or deviating in a mesial or distal aspect is a rare type of dental injury, as presented in this case [3]. According to classification given by Kapil Loomba et al, the fracture in this case is Type III Div 3B. Mesiodistal fractures as in this case can be treated using rubber dam clamp to stabilise the fracture segments, which were later reinforced with composite resin and restored finally with full crown [4].

Crown root fracture is a periodontal rather than an endodontic challenge. The treatment options for fractures involving the biological width include – orthodontic extrusion, fragment reattachment with or without crown lengthening or extraction in extreme cases.

In this case, fracture line extended till mid root region so orthodontic extrusion was not feasible due to poor crown root ratio that will remain after extrusion and also patient wanted immediate restoration of aesthetics and function. So, stabilisation of the fracture segments was planned with fiber reinforced composite post to create a monoblock effect [5].

Teeth restored with adhesive reattachment cannot withstand functional and orthodontic forces until prosthetic rehabilitation is performed [6]. Hence full crown was planned for added bracing effect and the creation of a monoblock. Adequate stabilization of fractured segments was obtained after intra radicular stabilisation with glass fiber post.

Although the reattachment is susceptible to the effects of cyclic fatigue and hydrolytic degradation over time, various studies have described functional and aesthetic success exceeding 7 years [1].

The fracture line had extended subgingivally in this case but, there was no evidence of periodontal pocketing during subsequent follow up period of 6 months and the periodontium remained healthy. The patient is still under follow-up for any signs of pocket formation or resorption. Major advantages of this procedure include cost effectiveness, maintenance of esthetics and conservation of natural tooth structure.

VII. Conclusion

The importance of preserving and retaining natural teeth, particularly anteriors in young patients cannot be overstated [7]. Teeth with crown root fractures which were considered unrestorable can now be salvaged due to the major advents in adhesive dentistry and these natural teeth can serve as better alternative to extraction and implant placement. Immediate care involving restoration of aesthetics and function is the norm wherever feasible. Long term clinical studies are required to conclusively recommend this re-attachment procedure for the management of complicated crown-root fractures.

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