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Management Of Complicated Crown Root Fracture By Intentional Replantation- A Case Report

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Abstract*: Complicated crown root fractures in teeth poses great challenges to the clinician in the diagnosis and management. The prognosis of such teeth is questionable as extraction of the tooth is the most common treatment option. However, conservative treatment options such as reconstruction of the fractured fragments with fibre post and dual cure resin, followed by intentional replantation has been suggested as an alternative treatment approach. The present case report describes successful management of an unusual complicated crown root fracture of a maxillary left central incisor in a 24-year-old male by reconstructing the fragments with a fibre post and dual cure resin followed by intentional replantation. At one year follow up, the patient was asymptomatic, with normal clinical and radiographic features with restored esthetics.*

Keywords: *complicated crown root fracture, intentional replantation, fiber post, dual cure resin*

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I. Introduction

Dental trauma is usually sudden, circumstantial, unexpected, accidental occurrence and often requires emergency attention. A crown-root fracture is a type of dental trauma, usually resulting from horizontal impact, which involves enamel, dentin and cementum, extending cervical to the gingival margin and may be classified as complicated or uncomplicated, depending on whether pulp involvement is present or absent[1].

The location, fit and finish of restorative margins are critical factors in the maintenance of periodontal health in such situations. To perform a coronal restoration it is necessary to reestablish the biological width so that margin of restoration can be placed appropriately without invading periodontal structures.[4]

Treatment options of a subgingival or infraosseous fracture include orthodontic or surgical extrusions, gingivectomy and osteotomy and intentional replantation.[6] Grossman in 1982 stated that Intentional Replantation , ' the act of deliberately removing a tooth and following examination, diagnosis, endodontic manipulation, and repair—returning the tooth to its original socket to correct an apparent clinical or radiographic endodontic failure.'[7]. It is a one-stage treatment that would maintain the natural tooth esthetics if successful.

We have documented a clinical case to exemplify the potential of intentional replantation as a viable treatment option in management of complicated crown root fracture

II. Case Report

History and Examination

A 24 year old male patient reported to the Department with the chief complaint of severe pain and fractured upper front tooth due to trauma before 2 hours. Intraoral examination showed oblique fracture of middle third of the crown facially involving the enamel, dentin, pulp and extending subgingivally on the palatal aspect of 21(fig.1a)and also an incomplete fracture line was seen in the midline of the crown in the incisal third on the labial surface. Fracture lines were not vivid on the palatal aspect of the crown in 21 (fig.1 c). Bleeding and severe tenderness were present while manipulating the fractured fragments in relation to 21.There was also evidence of fracture involving the enamel and dentin in relation to 22, 23. Pulp sensibility tests were non contributory.

Radiographic Examination

Intraoral periapical radiographic examination of 21 22 23 showed horizontal radiolucent line seen at the middle third of root in relation to 21(fig 1 b).

Diagnosis

Complicated crown root fracture in 21 and uncomplicated crown fracture in 22, 23.

III. Treatment Plan

The treatment plan was as follows

1. Root canal treatment of 21
2. Atraumatic extraction
3. Reconstruction of fractured fragments
4. Intentional replantation
5. Post endo management of 21
6. Restoration of 22, 23

IV. Clinical Procedure

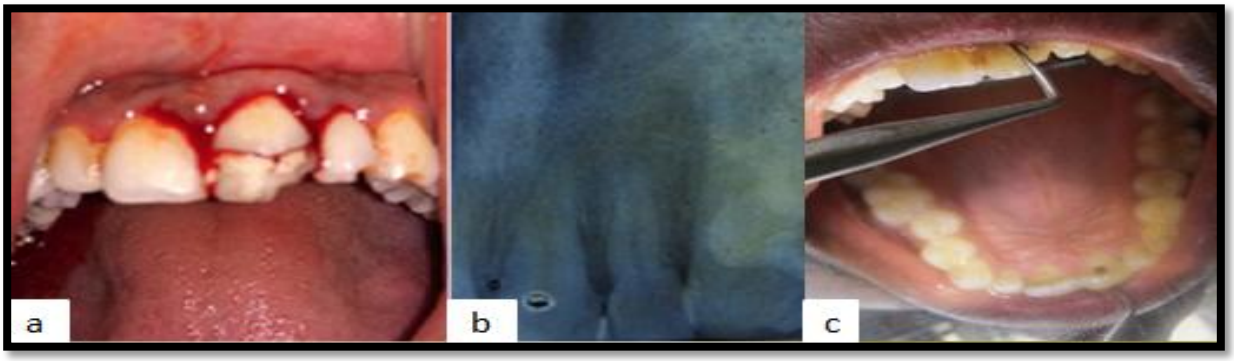
A written informed consent was obtained from the patient. The fractured fragments were stabilized using a flowable composite (Filtek™ Z350 XT Flowable Restorative- 3M India) on labial surface of 21. Root canal treatment was completed(fig.2). The tooth was then extracted atraumatically as a whole (fig.3-a -d) with care that the beaks of the extraction forceps did not go beyond the cemento-enamel junction (CEJ), as this might have damaged the cementum and the periodontal ligament. Upon examination, the fracture line extended through and through, splitting the tooth into two separate fragments. The patient was asked to bite lightly on sterile cotton until subsequent procedures were carried out. The fractured fragments were then reattached using self cure resin cement [Maxcem Elite™, Kerr dental, USA]. The root surface was minimally prepared using a small ¼ round diamond bur along the fracture line and was camouflaged with a thin mix of type IX GIC(GC GOLD LABEL 9). Post space preparation was done, retaining 6 mm of apical third of the obturation. The complete approximation of the tooth was assured clinically and radiographically (fig.4- a,b,c,d). The fibre post (RelyX™ Fiber Post-3M ESPE) was then luted using the self cure resin cement.

The tooth was carefully reinserted into its socket , stabilized with sutures and splinted with a suitable length of 40 lb nylon fishing line fitted to the labial surfaces of 13 to 23(fig.5a &b). Post operative oral hygiene instructions were given. The sutures were removed after 7 days.(fig 6 a). The patient was recalled after two weeks and the splint was removed (fig 6 b &c). After one month, crown preparation was done in 21, 22 and restored with metal ceramic crowns (fig.7a&b). Uncomplicated crown fracture in 23 was restored with light cure composite restoration(Te-Econom Plus-ivoclar vivadent, India). At 1 year follow up, the tooth was completely asymptomatic, radiographically sound and probing depth and mobility within normal physiological limits. (fig.8 a& b).

V. Discussion

Traumatic dental injuries occur with a higher frequency in toddlers, school age children, and in young adults which constitutes of about 5% of all injuries for which people seek treatment [1] and present a great challenge worldwide. Therefore, correct diagnosis and appropriate treatment planning and follow up are desperate to ensure favorable outcome.

Currently, various alternative treatments have been proposed for teeth with sub gingival fractures [9]. The main aim of such treatments consist of exposing the fracture margin to a supra gingival level, so that the restoration procedures can be conducted without moisture contamination [10]. A gingivectomy and osteotomy or surgical extrusion of the root fragment after the endodontic treatment may expose the fractured dental margin. However, it is not indicated in areas of high esthetic demand, as these procedures decrease the crown-root ratio or sometimes cause alteration of the biological width [6]. Surgical extrusion is a single-step and less time consuming procedure. But in this case as the fracture line has extended to the middle third of the root, surgical extrusion and final restoration may compromise the crown root ratio which again lead to doubtful prognosis of the tooth.



Figs 1a-c: (a) Pre-operative picture. (b)-intra oral peri apical radiograph.(c)palatal view

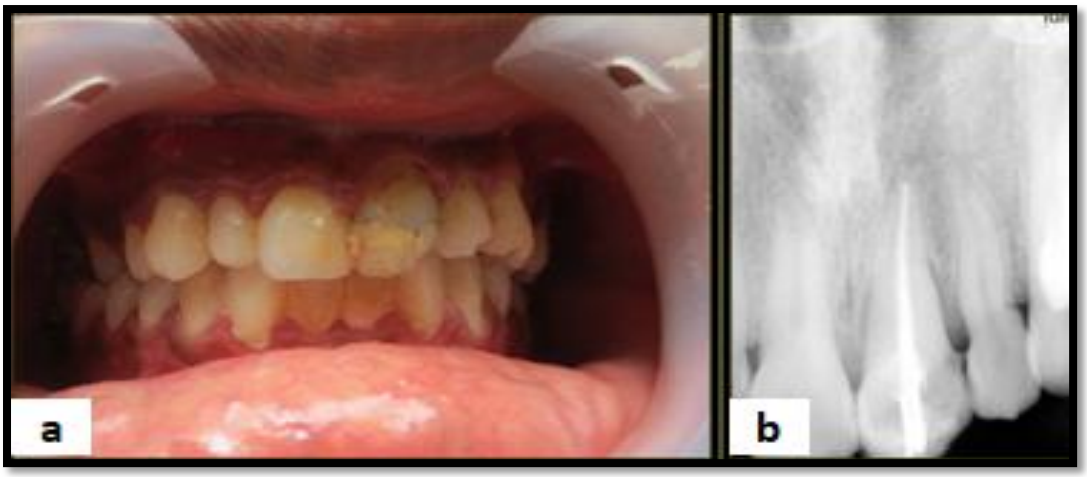


Fig 2.a, b-(a) fractured fragments stabilized using flowable composite. (b) root canal treatment in 21

Intentional replantation is defined as the purposeful extraction of a tooth in order to repair a defect or cause of treatment failure and thereafter the return of the tooth to its original socket [3]. Any tooth that can be atraumatically removed in one piece is a potential candidate for intentional replantation. However, specific indications include ,when all other endodontic non-surgical and surgical treatments have failed or are considered impossible to perform a successful restoration [5].

In this case, the pulp may be compromised because of the complicated crown root fracture and possible bacterial contamination at the critical time when the pulp's blood supply is either reduced or severed, resulting in a higher chance of pulp necrosis leading to infection of the root canal system[13]. Therefore, immediate root canal treatment followed by atraumatic extraction, reconstruction ,replantation and splinting has been considered as feasible treatment option for this case.

The prime factors that are necessary to provide long term prognosis for a tooth to be replanted intentionally are, the shortest extra oral dry time as possible[12], atraumatic extraction to minimise damage to the cementum and the periodontal ligament [14]. The periodontal ligament attached to the root surface was kept moist using cotton soaked with saline solution throughout the procedure [5].

Here fibre post serves as an intraradicular splint to approximate and reconstruct the fragments for a better healing of the fracture, as well to help reinforce the coronal fragment [15]. Fiber reinforced composite resin post with adhesive resin technology offers many advantages for reattachment procedure such as conservation of tooth structure, bonding to the tooth structure, modulus of elasticity equal to that of dentin, simplicity of the procedure and cost-effectiveness. Chamfering the fracture line minimally and camouflaged with TYPE IX GIC provides good sealing ability (Vermeersch et al 2005), increase in bond strength [8], antibacterial effect , epithelial and connective tissue adherence (Dragoo et al 1999).

Finally replanted tooth was stabilized using splints to prevent the excessive mobility of the tooth and to help the initial healing of PDL. The International Association of Dental Traumatology (IADT) guidelines recommend splinting types that are flexible rather than rigid and employed for shorter duration of preferably two weeks. Flexible splinting is more advantageous than rigid splints because it allows minimal amount of physiological mobility of the replanted tooth which aid in periodontal healing. [11]

After a follow-up period of 1 year [fig 8 a&b] , the patient was clinically healthy with normal function,no mobility and radiographically exhibited no periapical pathology or bone loss. Of the possible options, intentional replantation is an easy and safe procedure that represents a conservative approach rather than extracting the crown root fractured tooth or when compared to other clinical intervention.

Conclusion

The management of complicated crown root fractures in teeth is often more challenging with questionable prognosis and extraction of the tooth being the most common treatment option. However, conservative treatment options such as reconstruction of the fractured fragments with fibre post and dual cure resin followed by intentional replantation can be a viable treatment option for such teeth. But further long term follow up studies are needed to evaluate the same.

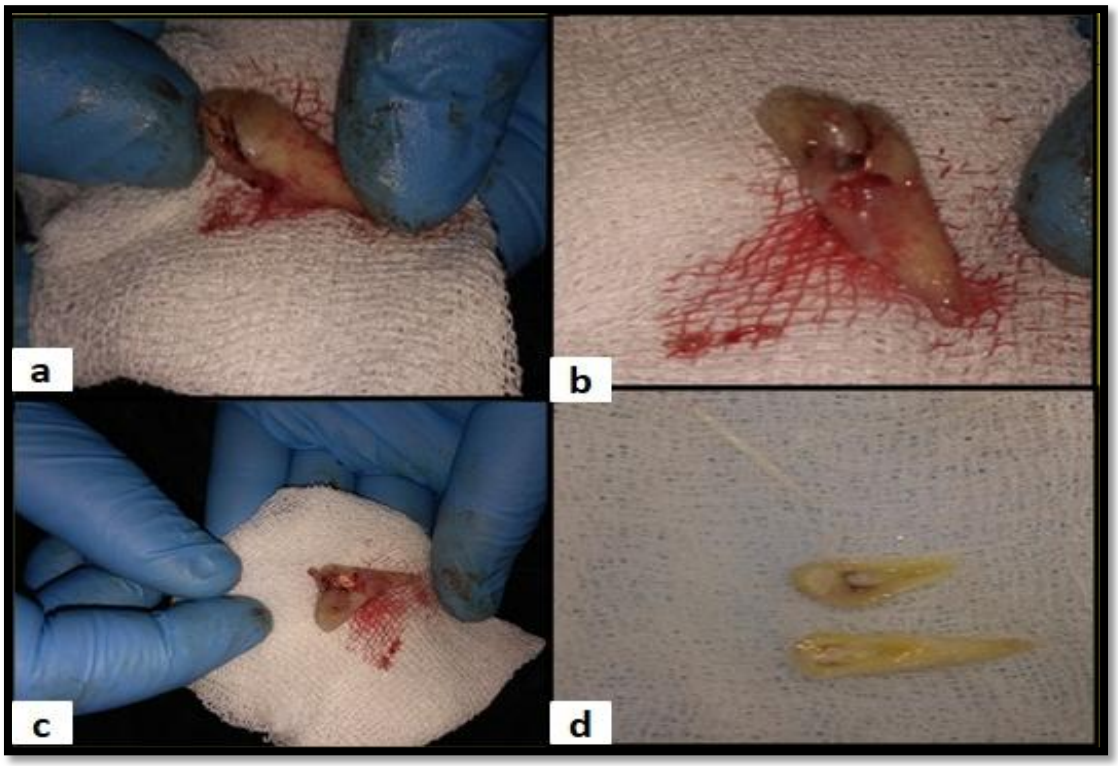


Fig 3 a-d. Atraumatic extraction of 21 (a)labial aspect (b)palatal aspect (c)occlusal aspect (d) extension of the fracture

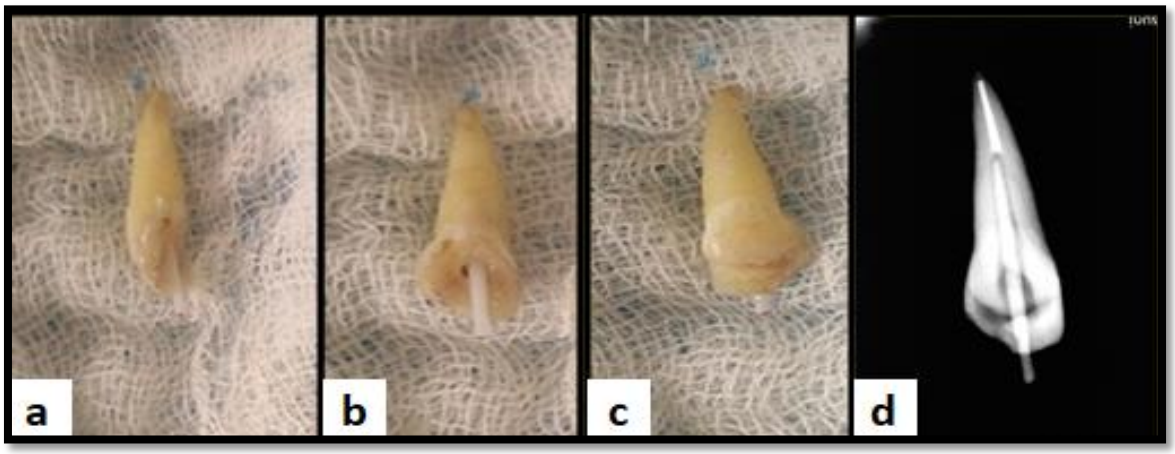


Fig 4a-d. completely approximated and reconstructed 21 using self cure resin cement and fibre post

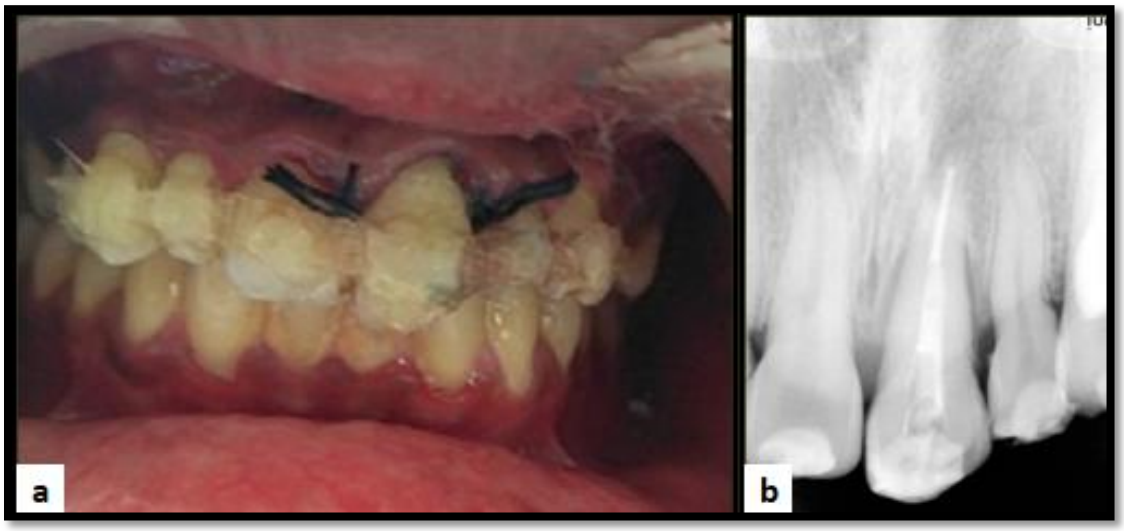


Fig 5a& b. (a) 21 replanted into the socket, sutured and splinted from 13 to 23 using a flexible splinted. (b) radiographic picture immediately after replantation.

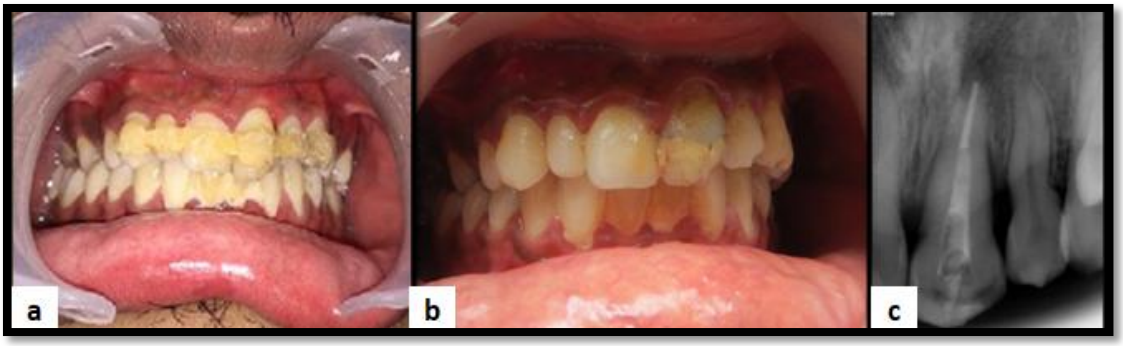


Fig 6 a-c (a) sutures removed after one week. (b) splinting removed after 2 weeks. (c)IOPA after suture removal

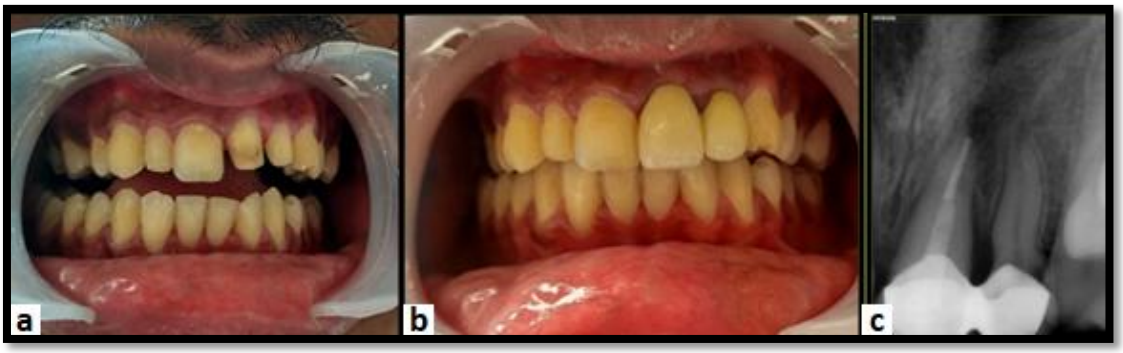


Fig 7 a-c. (a) crown preparation in 21, 22. (b) metal ceramic restoration in 21 22. (c) intraoral periapical radiograph of 21 22

Fig8 a & b one year follow up

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