

Open Access

Intentional Replantation with 180° Rotation of a Crown-Root Fracture as a Last Expedient: A Case Report

Sajjan GS1*, Balaga P1, Varma K1 and Sajjan S2

¹Department of Conservative Dentistry and Endodontics, Vishnu Dental College, Bhimavaram, Andhra Pradesh, India ²Department of Prosthodontics, Vishnu Dental College, Bhimavaram, Andhra Pradesh, India

Abstract

The treatment of complicated crown-root fractures of tooth is often compromised by a fracture apical to the gingival margin and/or bone. This makes isolation difficult and compromises the adhesive union which is critical for a successful treatment. In the present case, the fracture line extended from cervical third of labial surface to cervical third of palatal surface sub gingivally which made the case a complicated crown root fracture. The reattachment of fragments would bring the vulnerable joint in the primary stress bearing area and in the subgingival region. Hence the tooth was removed traumatically with the help of periotome and intentional replantation was done which facilitated the attachment of fragments extra orally. Fragments reattachment was reinforced with the intraradicular fiber post and glass ionomer cement. Then the tooth was rotated 180° to bring the subgingival fracture line to the labial surface where the occlusal load is less. As the amount of extra oral time is a critical factor in the success of reimplantation, the procedure was completed in 20 minutes. The teeth were stabilized with semi rigid splint for 6 weeks. Later full veneer crown was cemented on the tooth. The patient was followed up with clinical examination for mobility test, gingival sulcus depth and radiographic analysis to analyze the integrity of root, the alveolar cortex and the periodontal space for 12 months. The treatment is successful so far and has rendered satisfaction to both the clinician and patient.

Keywords: Tooth replantation; Intentional replantation; Crown root fracture; Splinting

Introduction

Trauma resulting in crown-root fracture is one of the most challenging fracture types. Factors influencing the management of traumatized tooth include extent and pattern of fracture, pulpal involvement, stage of root development, alveolar bone fracture, and involvement of biologic width, soft-tissue injuries, presence/absence of fractured tooth fragment, secondary traumatic injuries, occlusion, and esthetics. Reattachment of tooth fragment to a fractured tooth remains as the treatment of choice because of its simplicity, natural esthetics, and conservation of tooth structure [1].

In the crown root fracture, the fracture lines can extend horizontally or vertically, sometimes sub gingivally making the prognosis unpredictable. A crown-root fracture is a type of dental trauma, usually results from horizontal impact and represents 5% of all dental injuries. These fractures involve enamel, dentin and cementum, occurring apical to the gingival margin. Depending on the presence or absence of pulpal involvement, they are classified as complicated or uncomplicated fractures. A crown-root fracture often involves the biologic width which is the sum of the lengths of epithelial and connective tissue attachment to the tooth [2].

The outcome of the treatment is influenced by patient's age, severity and the method of treatment offered. Choosing a proper treatment can have a significant effect on prognosis especially in case of severe trauma.

Intentional replantation is the deliberate extraction and reinsertion of a tooth into its own socket. The goal of this procedure is to permit the completion of endodontic treatment or restoration, which might otherwise be impossible to perform. If the fracture line extends subgingivally on the palatal region, rotational reimplantation can be done. Though few reports are done regarding such treatment, the success of the present case was the inspiration for this publication [3].

Case Report

History

A 20-year-old male reported with a chief complaint of broken upper front tooth for the past one week.

History of presenting illness

Patient was hit by door and he stored fractured tooth fragment in water for 1 week.

Past dental history

Patient reported history of previous trauma 2 years back for which reattachment of coronal tooth structure was performed with no postoperative complications in 21. Root canal treatment was initiated in 22 as tooth was non vital, but patient didn't return for the completion of treatment due to personal reasons.

Emergency visit and examination

An oblique crown root fracture extending from labial cervical third of crown to the palatal cervical third of root structure was observed in 22 (Figures 1 and 2). No additional root fracture or periapical pathology was noted in periapical radiographs obtained at different angulations (Figures 3 and 4).

*Corresponding author: Sajjan GS, Department of Conservative Dentistry and Endodontics, Vishnu Dental College, Bhimavaram, Andhra Pradesh, India, Tel: 8179846088; E-mail: girijasajjan@yahoo.com

Received January 18, 2018; Accepted February 02, 2018; Published February 05, 2018

Citation: Sajjan GS, Balaga P, Varma K, Sajjan S (2018) Intentional Replantation with 180° Rotation of a Crown-Root Fracture as a Last Expedient: A Case Report. Bioceram Dev Appl 8: 111. doi: 10.4172/2090-5025.1000111

Copyright: © 2018 Sajjan GS, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Page 2 of 4



Figure 1: Pre-operative clinical photograph with fractured 22 (labial view).



Figure 2: Broken fragment of 22.



Figure 3: Pre-operative radiograph.



Diagnosis and treatment decision

Diagnosis of Ellis class VIII fracture in 22 was made. The treatment decision required consideration of several options. Reattachment requires isolation of the field which was difficult in this case as the fracture line extended sub-gingivally. So final treatment plan chosen involved intentional extraction of the tooth, reattachment of the fragments and rotational replantation of the tooth.

Visit 1: Root canal therapy and intentional replantation

The fractured tooth fragment was evaluated under dental operating microscope (Karl Zeiss OPIM) for any defect (Figure 3). Then the tooth fragment was stored in phosphate buffered saline. After modification of access cavity, working length was determined and confirmed by apex locator (D Propex Densply) and IOPA radiographs. Biomechanical preparation was done by step back technique using hand files (Mani INC, Japan) and the root canal was obturated with sectional Gutta Percha (Pearl Dent Co. Ltd, India) and zinc oxide eugenol sealer(Dental products of India. Ltd, India). After sectional obturation, post (D.T. Light–Post X-RO France) selection was done (Figure 5). Temporary restoration (Orafil-G Prevest Den Pro limited-India) was placed.

Surgical site was prepared with disinfectant and the tooth was anaesthetized with 2% lignocaine with 1:200000 Adrenalines (Nirma Limited India). Tooth was removed atraumatically using periotome (HU-Friedy)-USA) (Figures 6 and 7). The tooth was wrapped with gauze soaked with physiological saline solution. With restorative composite resin, the palatal surface of fractured coronal tooth structure was recontoured to appear as labial surface and labial surface was modified in to palatal surface.

The prefabricated post was cemented in the remaining space of root canal extending in to coronal fragment, root and crown fragments were approximated and reattached using a Type -I glass ionomer (GC Corporation-Japan.) cement. After application of tetracycline on to the root surface to aid in the prevention of infection and to maintain the viability of PDL (Figure 8), the tooth was rotated 180° and replanted (Figure 9).



Figure 5: Extraction of 22 using periotome.



Figure 6: Radiograph of extracted site.



Figure 7: Semi rigid splint with 21, 22 and 23.



Figure 8: Post splinting radiograph.



Figure 9: Post-endodontic crowns on 21 and 22.



Following occlusal adjustment, the correct reposition was confirmed by IOPA radiograph (Figure 10). A semi rigid splint was placed from tooth no. 21 to tooth no.23 by using composite resin (Tetric N-Ceram- Ivoclar Vivadent- Liechtenstein). The total extra oral time was approximately 20 min. The patient was given postoperative instructions for a soft diet, and oral hygiene instructions. Antibiotic therapy, Amoxicillin 500 mg (Ampoxin-Unichem India) after each 8 h was given for 1 week to prevent contamination that could lead to inflammatory root resorption. The patient was asymptomatic on the following day.

Visit 2: Splint removal (6 weeks after replantation)

The patient returned for splint removal and follow up. The patient's oral hygiene was satisfactory. The splint was removed. On clinical examination mobility was present with in physiologic limits, with normal periodontal probing depth of 2 mm. A periapical radiograph revealed evidence of bone healing and intact lamina dura.

Visit 3: Tooth preparation

One week after removal of splint, tooth preparation for all ceramic crowns was done on 21 and 22. Crowns were cemented using resin cement (Relyx X U200 -3M Dents chland GmbH-Germany). Clinical and radiographic evaluation of 3 and 6 months revealed success.

Discussion

Management of complicated crown-root fractures remains a challenge. This is due to difficulty in achieving isolation with a rubber dam for a dry operating field, which might compromise the hermetic seal of restoration. Treatment options for such cases include:

- (i) Orthodontic or surgical extrusion
- (ii) Gingivectomy and osteotomy/osteoplasty
- (iii) Intentional replantation
- (iv) Extraction followed by replacement

Various treatment modalities have been proposed for crown-root fractures; like removal of coronal fragment with subsequent restoration above gingival level. This allows the subgingival portion of the fracture to heal with formation of a long junctional epithelium. The second option is to convert the sub-gingival fracture to a supragingivally fracture with the help of gingivectomy and osteotomy procedures. However, it is not indicated in the highly aesthetic zone. The third option is removal of the coronal fragment and surgical extrusion of the tooth to move the fracture to a supragingivally position. In this procedure, the periodontal ligament may fail to reattach to the root surface and remarkably increases the risk of root resorption. The fourth modality of the treatment is removal of the coronal fragment and subsequent orthodontic extrusion of the tooth [4-6]. Grossman stated intentional replantation as "A deliberate act of removing a tooth and following examination, diagnosis, endodontic manipulation and The success rate for intentional replantation ranges from 52% to 86%. According to Siskin the criteria for success includes: the presence of a relatively normal periodontal membrane space, the re-establishment of a sulcular epithelium with minimal inflammation of the marginal gingiva, and the absence of periodontal pockets [8]. Surgical extrusion was not done in this case as the extrusion of the tooth to bring the fracture site supragingivally would have led to decreased root length. Gingivoplasty or osteoplasty or surgical exposure of fractured site and reattachment was not considered for aesthetic reasons. The fractured segment was in the cervical third of crown and root in the palatal region which is the primary stress bearing area in case of anterior teeth.

The structure of anterior teeth themselves, have a comparatively different stress pattern, as a result of occlusal loading from that of posterior teeth. Anterior teeth have their maximal bulk gingivally. They taper incisally with the least bulk at the incisal ridge. So, resistance to stress fractures will be maximum at the gingival end and decrease incisally. Forces are directed horizontally and vertically on anterior teeth as mentioned with the force analyses. These forces accumulate maximal shear stresses at the junction of the clinical root with the clinical crown on the loading surface. The labial enamel plate is much thicker than the lingual or proximal ones, with maximal thickness of enamel usually at the incisal edge.

Hence it was decided to do an intentional replantation with 180° rotation to bring the compromised fracture site in to non-stress bearing area after the reattachment. This provides a better biological space for periodontal healing and minimizes periodontal pocket formation. A very important concern in such procedure is atraumatic removal of tooth and minimal extra oral time [9]. So, the tooth was removed atraumatically with a periotome and the extra oral time was only 20 minutes. Tetracycline was applied on to the root surface to prevent infection and facilitate periodontal healing [10]. Healing occurs by revascularization of ruptured ligament and establishment of new gingival adhesion. Union of the ruptured fibers and establishment of gingival adhesion requires a week. After two weeks periodontium will attain its two- thirds of its original adhesion [11].

Conclusion

The successful intentional replantation should satisfy clinical and radiographic criteria [12]. Clinically the tooth should be normal in function with normal mobility with healthy Periodontium. Radiographically there should be no resorption or ankylosis of root, normal periapical structures without apical radiolucency or resorption. This was appreciated in the follow-up recalls.

Because of the complicated nature of fracture, an intentional, rotational implantation was carried out. The delicate reattached site was brought to the labial surface. Atraumatic removal, short extra oral time followed by antibiotic therapy led to adequate repair. However clinical and radiographic evaluation should be done at least for 5 years.

References

- Bindo TZ, De Morais EC, De Campos EA, Gonzaga CC, Correr GM, et al. (2010) Multidisciplinary approach of a crown-root fracture using intentional replantation: a case report. Pediatr Dent 32: 428-432.
- 2. Andreasen JO, Andreasen FM, Andersson L (2010) Traumatic injuries to teeth (4th edn) p. 2.
- 3. Wang Z, Heffernan M, Vann WF Jr. (2008) Management of a complicated

Page 4 of 4

crown-root fracture in a young permanent incisor using intentional replantation. Dental Traumatol 24: 100-103.

- Bondemark L, Kurol J, Hallonsten AL, Andreasen JO (1997) Attractive magnets for orthodontic extrusion of crown-root fractured teeth. Am J Orthod Dentofacial Orthop 112:187–193.
- Andreasen JO, Andreasen FM (1991) Essentials of traumatic injuries to the teeth (1st edn). Munksgaard Copenhagen, Denmark. pp: 47–62.
- 6. Grossman LI (1966) Intentional replantation of teeth. J Am Dent Assoc 72: 1111–1118.
- 7. Grossmann L (1988) Endodontic practice (11th edn) Lea and Febiger, Philadelphia, USA.
- Guy SC, Goerig AC (1984) Intentional replantation: Technique and rationale. Quintessence Int Dent Dig 15: 595-603.
- 9. Coccia CT (1980) A clinical investigation of root resorption rates in reimplanted young permenant incisor: A five year study. J Endod 6: 413-420.
- Lu DP (1986) Intentional replantation of periodontally involved and endontically mistreated tooth. Oral surg oral med oral pathol 61: 508-513.
- 11. Rouhani A, Javidi B, Habibi M, Jafarzadeh H (2011) Intentional replantation: A procedure as a last resort. J Contemp pract 12: 486-492.
- 12. Enmertsen E (1956) Replantation of extracted molar: Preliminary report. Oral Surg Oral Med Pathol 9: 115-122.