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Dr. Aruna Raj
Associate Professor, Department
of Dental Surgery Government
Kilpauk Medical College and
Hospital, Kilpauk, Chennai,
Tamil Nadu, India

Dr. Vinothini K
Post Graduate Student
Department of Conservative
Dentistry and Endodontics
Tamil Nadu Government Dental
College and Hospital, Chennai,
Tamil Nadu, India

Dr. Nandhini A
Associate Professor, Department
of Conservative Dentistry and
Endodontics Tamil Nadu
Government Dental College and
Hospital, Chennai, Tamil Nadu,
India

**Dr. Ramaprabha
Balasubramaniam**
Associate Professor, Department
of Conservative Dentistry and
Endodontics Tamil Nadu
Government Dental College and
Hospital, Chennai, Tamil Nadu,
India

Corresponding Author:
Dr. Vinothini K
Post Graduate Student
Department of Conservative
Dentistry and Endodontics
Tamil Nadu Government Dental
College and Hospital, Chennai,
Tamil Nadu, India

Intentional replantation with 180-degree rotation: an alternative approach for establishing biologic width- A case report

Dr. Aruna Raj, Dr. Vinothini K, Dr. Nandhini A and Dr. Ramaprabha Balasubramaniam

Abstract

Complicated crown root fractures when encountered are difficult to treat and have a bad prognosis. Several types of treatment approaches have been in practice for its management like gingivectomy, orthodontic or surgical extrusion; however, these approaches can be time-consuming, aesthetically compromising, expensive, and unsatisfactory when the fracture line is deep below the gingiva. Intentional replantation with 180 degree rotation consists of extraction, 180 degrees rotation and replantation, thus restoring the biological space. Our case presentation will discuss the treatment options for management of complicated cases and the concept of intentional replantation as an option for management in young permanent anterior teeth by re-establishing the biologic width.

Keywords: complicated crown-root fracture, intentional replantation, biologic width, 180 degree rotation

1. Introduction

Trauma comprises 5% of all dental disorders affecting 33% of young adults ^[1]. Maxillary central incisors are the most commonly affected teeth by traumatic incidents like self falls, road traffic accidents and foreign bodies striking the teeth, with injuries ranging from simple infarction to complete loss of teeth ^[2].

Crown-root fractures have been classified as complicated and uncomplicated (N.502.54) by the World Health Organization in its application of International Classification of Diseases to Dentistry and Stomatology (1994) with a 5% prevalence. Complicated crown root fracture involves enamel, dentin, and cementum along with pulp exposure. The various clinical presentation of this type of fracture is vertical crown-root fracture, oblique crown-root fracture and multiple crown-root fracture which depends on the direction and impact of the force delivered ^[3]. Oblique crown-root fracture is a fracture in which fracture line originates in the crown portion and extends apically into the root in an oblique direction ^[4].

Crown-root fractures possess a restorative challenge especially when the fracture margin is located subgingivally, which would encroach on the biologic width with subsequent gingival inflammation, clinical attachment loss, and bone loss. This would be clinically manifested as gingival bleeding, deepened periodontal pockets or gingival recession.

Several treatment modalities are proposed for the management of this type of fracture which includes crown lengthening by gingivectomy and ostectomy, orthodontic or surgical extrusion, Intentional replantation with 180-degree rotation, reattachment of the coronal fragment if present and extraction of the teeth with hopeless prognosis.

This article presents a case of successful management of a complicated crown-root fracture by intentional replantation with 180° rotation.

2. Case report

A 26-year-old male patient reported to the Department of Conservative Dentistry and Endodontics of Tamil Nadu Government Dental College with the chief complaint of fractured upper front tooth region. The patient had history of trauma due to road traffic accident before 2 years. The patient had no contributory dental and medical history. Clinical examination

revealed complicated Crown root fracture in 11 (Loomba *et al.* Type IV div 2) and 21(Loomba *et al.* Type IV div 1) (Fig 1 a & b). The Thermal and Electrical Pulp Tester (EPT) (Analytic Technology Pulp Tester®, Redmond, WA, USA) tests indicated that the tooth 11, 21 is non-vital. The fracture line was located 3mm below the gingival margin in the distobuccal surface to 2 mm below the gingival margin in the mesiobuccal surface in 11. Intraoral periapical radiograph showed loss of coronal tooth structure involving enamel, dentine, cementum and pulp in 11: enamel, dentine and pulp in 21 (Fig 2). The patient was scheduled for root canal treatment followed by post endodontic restoration. Since 11 had a complicated Crown root fracture with minimal clinical crown height, Intentional replantation with 180° rotation was scheduled post endodontic treatment.



Fig 1: Preoperative photograph

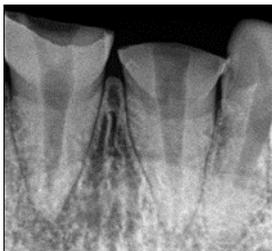


Fig 2: Preoperative radiograph

After rubber dam isolation, access opening was done using a no 4 round diamond bur (Mani Diamond-Burs Inc.,) and the patency of the canal was checked using size 10 K file (Mani, Inc.,).This was followed by working length determination: 19.5mm in 11 and 20.5mm in 21. Cleaning and shaping was done using 2% k files (Mani, Inc.,) with step back technique along with 3% sodium hypochlorite irrigation. This was followed by obturation using the lateral condensation technique with Gutta-percha and zinc oxide eugenol as sealer (Fig 3). The tooth 11 was restored with intermediate restorative material (Dentsply De Trey, Konstanz, Germany); the tooth 21 was restored with glass ionomer cement (GC Type 2).



Fig 3: Root canal treatment in 11 and 21

Under local anaesthesia (2% Lignocaine with 1:80,000 Adrenaline), 11 was atraumatically extracted, withdrawn coronally by 2 mm, rotated to 180 degrees and placed back into the socket (Fig 4). The replanted tooth was stabilized by splinting using a semi-rigid 0.7 mm stainless steel wire and light cure composite resin (Ivoclar Vivadent) from 13 to 23 for 2 weeks (Fig 5). Occlusal adjustment was performed and the patient was advised for soft diet and instructed to avoid biting in the upper front tooth region. An Antibiotic (Amoxicillin 500mg) every 8 hrs for 7 days and chlorhexidine mouth rinse 0.2% were prescribed to prevent infection. After 2 weeks the splint was removed and assessment was made for gingival bleeding and mobility of the replanted tooth and the healing was found to be satisfactory.



Fig 4: Intentionally replanted 11



Fig 5: Semi rigid splinting

After one month, post space preparation was done in 11 using peeso reamers (Mani) of size 4 and 3 respectively. This was followed by placement of an individually formable glass fibre post (Everstick fiber post, GC Europe) of size 1.5 mm in 11. The fibres were adapted inside the root canal and cemented using the resin cement (Multilink speed, Ivoclar Vivadent) (Fig 6). Light curing was done from above of the post and the cement perpendicular to the fibres for 40 seconds (Fig 7).



Fig 6: Anatomical post adaptation in 11



Fig 7: Light curing of anatomical post in 11

Core build up was done for 11 and 21 with light cure composite resin (Ivoclar Vivadent) followed by tooth preparation (Fig 8) and cementation of Porcelain fused to metal crown in 11 and 2 (Fig 9, 10).



Fig 8: Tooth preparation in 11, 21



Fig 9: Metal ceramic crown cementation in 11, 21

Postoperative follow-up was done for a period of 1 month, 6 months, and 12 months (Fig 11). Clinical and radiographic evaluation showed normal probing depths, clinical attachment levels, and normal mobility with no evidence of root resorption or ankylosis in 11.



Fig 10: Immediate post operative radiograph



Fig 11: 6 months and one year follow up radiograph

3. Discussion

The biological width is defined as the dimension of space that the healthy gingival tissues occupies between the base of the sulcus and underlying alveolar bone^[5]. Ingber *et al* (1977) suggested that a minimum of 3 mm was required from the restorative margin to the alveolar crest to permit adequate healing and restoration of the tooth^[6]. Placement of restorations encroaching the biologic width leads to destructive gingival inflammation and recession as the body attempts to recreate the lost space.

Restoring a complicated Crown root fracture, without invading the biological width is a challenging procedure. Tooth replantation with 180° rotation is a therapeutic

alternative that allows the natural dentition to form new alveolar bone and to re-establish the attachment apparatus in a biological way^[7]. Intentional replantation or forceps eruption has several advantages. It takes less time and enables more precise identification of the fracture line^[8]. In this procedure, after tooth extraction, tooth is replanted in a more coronal position to facilitate its restoration. In the case of palatally inclined fracture, 180° rotation has a special advantage compared to other procedures, that only slight extrusion is necessary to accommodate coronal restoration due to difference in the position of the cemento-enamel junction labially and palatally.

Although surgical crown lengthening offers required results, it would lead to compromised esthetics and could cause resorption of the labial cortical plate which interferes with the placement of future dental implant. Orthodontic extrusion on the other hand is time consuming and would also cause undesirable gingival overgrowth. Success in intentional replantation with 180 degree rotation depends on proper case selection as the procedure is contraindicated in periodontal disease with pronounced mobility, gingival inflammation, and tooth with divergent roots or dilacerations^[9]. Root resorption and ankylosis are potential complications of this procedure. This could be avoided by maintaining an intact periodontal ligament which could be achieved by minimizing the extra alveolar time, preventing contamination, and adopting atraumatic extraction procedures^[10, 11]. Data on survival rate of intentionally replanted teeth is limited. Success rate of this procedure was reported to be 72% to 88%.

Anatomical post (ever Stick GC Europe) minimizes the canal preparation by adapting to the morphology of the canal. It has high flexural strength and elastic modulus similar to the tooth structure. Moreover the polymerization shrinkage and S factor is reduced and hence increases the longevity of the restoration^[12]. Thus to reinforce the tooth without further weakening it anatomical post was chosen.

4. Conclusion

Thus intentional replantation with 180 degree rotation is a valuable treatment option for complicated crown root fracture as it has the advantage of providing superior and esthetic results with reduced treatment time and also acts as an economically acceptable treatment procedure over the other available options.

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