Case Report:

Intentional Replantation to Rehabilitate and Preserve the Integrity of Maxillary Central Incisor with Complicated Crown En-masse Fracture

Authors:

Prajwal Shetty, Department of Conservative Dentistry And Endodontics, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India,

Preethesh Shetty, Department of Conservative Dentistry and Endodontics, AB Shetty Memorial Institute of Dental Sciences(ABSMIDS), Nitte (Deemed to be University), Mangaluru, Karnataka, India,

Raksha Bhat, Department of Conservative Dentistry and Endodontics, AB Shetty Memorial Institute of Dental Sciences(ABSMIDS), Nitte (Deemed to be University), Mangaluru, Karnataka, India.

Address for Correspondence

Preethesh Shetty,
Department of Conservative Dentistry and Endodontics,
AB Shetty Memorial Institute of Dental Sciences(ABSMIDS),
Nitte (Deemed to be University),
Mangaluru, Karnataka, India.
E-mail: drpreetheshshetty@nitte.edu.in.

Citation


Submitted: Jun 14, 2022; Revised: Oct 5, 2022; Accepted: Oct 9, 2022; Published: Nov 15, 2022

Abstract: The present case aims to describe the management of a complicated crown en masse fracture in a maxillary central incisor due to trauma by intentional replantation as the chosen treatment modality. Intentional replantation aiming towards successful endodontic therapy comprises intentional therapeutic extraction of the tooth and an endodontic procedure in a controlled environment followed by replantation. A 24-year-old female patient presented to the department with a chief complaint of broken upper front teeth following trauma. The teeth were tender on percussion. The periapical radiographic examination revealed a complicated fracture involving the pulp without significant periapical changes. A diagnosis of Ellis Class III was established and intentional reimplantation was planned with the patients consent. Following an atraumatic extraction, conventional root canal treatment was completed. Subsequently, a fibre-post was used to reinforce the tooth structure. The tooth was placed back into the socket and splinted. One year of follow up examination revealed absence of pain and periapical healing. The treatment yielded a clinical, aesthetic and functionally satisfactory result, establishing intentional reimplantation to be a feasible treatment option in complicated crown en masse fracture of the tooth.

Key Words: Tooth reimplantation, Tooth fracture, Avulsed tooth, Endodontics

Introduction:

Intentional replantation is described as the procedure of intentionally extracting and reinserting the tooth into the extraction socket following a successful endodontic procedure. Ingle defines intentional replantation as the purposeful extraction of a tooth in order to repair a defect or cause of a treatment failure followed by returning the tooth to its original socket. Abulcasis first proposed the concept of extraction and replantation.[1] Intentional replantation necessitates minimal damage to the root surface during extraction, hence avoiding fracture risk and is especially preferable for single-rooted teeth. The reported success rate in retaining replanted teeth varies between 52- 95%.[2] The principal advantage of intentional replantation is the rehabilitation of healthy peri-radicular conditions. It involves meticulous inspection and repair of the inaccessible areas of the tooth without damaging the adjacent periodontal tissues[3]. Recurrent non-surgical endodontic treatment failure and impractical peri-radicular surgery are major indications for intentional replantation. However, teeth with curved roots, flared roots, periodontally involved teeth, teeth with vertical root fractures and non-restorable teeth are contraindications for intentional reimplantation. Nonetheless, due to its non-invasive and faster approach, literature advocates the success of this treatment modality plan over periradicular surgery even in cases of endo-peri lesions[4]. Also, intentional reimplantation negates the need for osteotomy along with enhanced visualisation and to the roots, with relatively more patient comfort and cost-effectiveness for the patient. Although, risk of vertical root fracture and postoperative complications of external root resorption and ankylosis have been reported in this treatment modality.[5] 5% of nearly all the injuries of the permanent dentition comprise of crown root fractures with direct trauma to the anterior region. The treatment of complicated crown-root fractures is often compromised by a fracture below the gingival margin and bone, rendering isolation difficult and compromising the hermetic seal, critical for successful endodontic treatment[6]. The present case report discusses the treatment options and introduces the concept of intentional replantation as an option to manage complicated crown-root fractures in fractured permanent anterior teeth.

Case Report:
A 24-year-old female patient reported a history of dental trauma to the upper front tooth two days before following a road traffic accident. The patient was unable to locate the fractured fragment at the accident site and reported to the hospital without it. The patient complained of severe throbbing and continuous pain concerning the traumatized tooth. Initial examination revealed minimal lacerations observed on the chin. The temporomandibular joint showed no clicking or deviation clinically. Medical and family history was non-contributory. Due to the presence of mobility of the anterior teeth, the patient had undergone arch-wire splinting with respect to the maxillary and mandibular anterior teeth as an immediate line of treatment from a private establishment a day prior to reporting to the department.

Intraoral examination revealed permanent dentition with moderate oral hygiene. Examination of the anterior area revealed a crown en masse fracture on 22, with the fracture extending subgingivally on the palatal aspect[Fig1A]. Tooth 24 and 25 were fractured coronally, classified as Ellis class I fracture. Radiographic examination revealed a complicated fracture involving the pulp with minimal periapical radiolucency on 22[Fig1B].[Table 1]

The patient made an informed decision to undergo intentional replantation after confirming the details, benefits, drawbacks of intentional replantation and discussing the alternative treatment modalities. Prior to initiation of treatment, the patient rinsed with chlorhexidine gluconate 0.12% and a preoperative anti-inflammatory drug was administered. Local anaesthesia was achieved by anterior infiltration and nasopalatine nerve block techniques with 2% lidocaine containing 1:100,000 epinephrine. With minimally saturated with sterile saline solution. Access to pulp chamber was achieved using Endoaccess bur #2 (Dentsply Maillefer, Switzerland). The working length estimation was done using an apex locator (RootZX II, J.Morita, USA). The biomechanical preparation was done using hand K files and Hand ProTaper files (Dentsply Maillefer, Ballaigues, Switzerland) up to F2[Fig2B]. The canals were flushed with 3% sodium hypochlorite (Pyrex, Prime dental products, Mumbai, India), 17% EDTA solution (Dent Wash, Prime dental products, Switzerland) up to F2[Fig2E]. The timeline of the presented case has been depicted in Table 2.

Discussion:
The treatment of complicated subgingival crown-root fractures in anterior teeth is a challenging undertaking. Intentional replantation was the recommended treatment plan for the case based on the diagnostic findings, the patient’s apprehension for surgical treatment, and the patient’s fundamental desire to preserve the tooth. The risks associated with the procedure of intentional replantation were discussed with the patient. Successfully, gentle atraumatic extraction was performed with the buccal of the instrument coronal to the cementoenamel junction to minimize injury to the periodontal ligament cells. The associated complications, related expenses, and longer duration of treatment time associated with routine endodontic procedures were avoided with intentional replantation as the treatment of choice. In the present case, following completion of treatment, the patient was extremely satisfied with the success of the treatment.
outcome comprising of an infection-free field with complete healing of the periapical region with adequate bone regeneration without any complications. The present case has been reported according to the PRICE Guidelines 2020.[Fig 2F]

![Fig 2: A) Tooth extracted atraumatically, B) Access cavity preparation followed by working length determination with a #15 K file, C) Obturation by F2 GP points following cleaning and shaping, D) Fibre post placed for reinforcement, E) Twelve month follow up](image)

The extra-alveolar time and handling play a significant role in the healing and pathology of a case of intentional replantation. The stage of root development also determines the prognosis of such a case. Maintaining viability of periodontal ligament cells along with intact cementum is essential to avoid post-reimplantation complications. In cases of mature teeth with closed apices, if the extra alveolar time is less than 60 minutes, then the tooth is replanted and splinted for two weeks. The duration of splinting is determined by the involvement of osseous fracture. In cases of bone fracture, the splint is kept for 6-8 weeks, and in the absence of a fracture, a splint of 2-3 weeks suffices.

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Clinical/Radiographic Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+1 week</td>
<td>1st follow-up</td>
<td>No pain, no swelling (symptom free). Negative percussion tests with no sign of ankylosis or resorption.</td>
</tr>
<tr>
<td>1 month</td>
<td>2nd follow-up</td>
<td>No pain, no swelling (symptom free). Negative percussion &amp; mobility with no sign of ankylosis or resorption.</td>
</tr>
<tr>
<td>+3 months</td>
<td>3rd follow-up</td>
<td>Negative percussion &amp; mobility with no sign of ankylosis or resorption.</td>
</tr>
<tr>
<td>+6 months</td>
<td>4th follow-up</td>
<td>Negative percussion &amp; mobility with no sign of ankylosis or resorption. Complete Osseous healing.</td>
</tr>
<tr>
<td>+12 months</td>
<td>5th follow-up</td>
<td>Negative percussion &amp; mobility with no sign of ankylosis or resorption. Increase in bone density.</td>
</tr>
</tbody>
</table>

An advantage of replanted teeth is that the clinician can debride the morbid parts of the root thoroughly by performing extraorally and under direct vision. In the present study, the patient reported a history of dental trauma to the upper front tooth two days before following a road traffic accident. The time elapsed since the accident is inversely proportional to the success rate obtained. However, the present case report showed a successful outcome despite the treatment done following a time interval. The patient had undergone moderately well done arch wire splinting of the arch prior to reporting to the dental hospital for treatment. The teeth were still partly mobile, making the teeth more predisposed to a compromised periodontium. Despite this, in the present case, a good prognosis with successful follow up was established. A post endodontic restoration with a fibre post and core was placed into the canal for enhanced reinforcement of the tooth followed by splinting. This step of stabilisation is unique to this case and aimed at controlling the inflammatory condition at the apical area of the tooth and provide us with a less inflammatory periodontal environment, in turn favoring bone regeneration.

As modern endodontic practice gives us the advantage of using magnification for enhanced precision, the entire procedure was done under 3.5X magnification. Also, the advent of novel materials has brought about an increase in success rates of endodontic treatment. The present case report utilised all the novel materials during the entire treatment procedure which has enhanced the treatment outcomes to achieve the best
possible results. The meticulous treatment planning and execution of the present case led us to achieving successful replantation at follow-up of over 12 months. Intentional reimplantation cases ever so often result in four major outcomes being, wherein there is healing with surface resorption, healing with the normal periodontal ligament, inflammatory root resorption and replacement resorption. Cho et al advocated an aggregate retention rate of 93% for 12 years and a healing rate of 77% in 3 year follow up cases of intentionally replanted teeth[5]. Mainkar in a systematic review and metaanalysis depicted a survival rate ranging from 83.8% to 94.4% in intentionally replanted teeth.[3] A majority of the failures are attributed to resorption leading to periodontal problems usually showing up clinically or radiographically up to a year; although, inflammatory resorption and ankylosis can occasionally be observed within a month to 2 months. In the present case, no signs and symptoms were seen clinically or radiographically in the present case at the end of 12 months. Torabinejad et al. established a consolidated mean survival of 88% with a mean of 4 years follow up in intentionally replanted teeth. 11% prevalence of postoperative complications of root resorption was reported in all studies[8]. Hayashi M et al demonstrated a clinical success rate after a 1 year follow up to be 89% but decreasing to 99% at the end of 5 years.[9] Jang et al. reported higher success rates with minimal extraoral time of around ≤15 min whereas Hammarström et al. reported an hour of extraoral time undergoing extensive root resorption whilst 15 min of extraoral time depicted enhanced periodontal healing[10]. The presented case exhibited healing with normal periodontal ligament response. Intentional replantation is not primarily the treatment of choice due to the high success rate of dental implants and endodontic therapy. However, intentional replantation may be considered a feasible treatment option in cases where a dental implant, nonsurgical retreatment or surgical treatment is not viable.

References: