

Bridging the Gap between Endodontic Failure and Success: A Case Report on Intentional Replantation

Abstract

This case report describes a case of intention replantation in a 15-year-old patient with a mandibular permanent right second molar that had undergone root canal treatment previously. The tooth was tender on percussion. Radiographic evaluation showed the presence of a separated instrument and periapical radiolucency. The surgical procedure was performed under local anesthesia, and the tooth was extracted. After cleaning and disinfecting the root canal system, the tooth was replanted, and the socket was filled with a mixture of bone graft material and a growth factor. A stainless steel crown was then placed to protect the tooth. A follow-up examination was performed after 12 months. The clinical and radiographic examinations revealed a well-healing periapical lesion with no signs of infection. The patient was asymptomatic, and the tooth was functional. The results of this case indicate that intentional replantation can lead to a favorable outcome.

Keywords: Case report, endodontics, intentional replantation, root canal treatment, separated instrument

Introduction

Intentional replantation (IR) is a cost-effective procedure, in which a tooth is deliberately removed and replanted after undergoing endodontic treatment and evaluation.^[1] In the past, IR was considered a last resort for saving teeth with a poor prognosis,^[2] but with improved techniques and materials, it is now seen as an acceptable treatment option in some cases.^[3] IR is indicated for conditions such as persistent apical periodontitis, endodontic-periodontal lesions, and cases where surgical access is inadequate. In addition, IR provides better visibility and fewer complications compared to periapical surgery. However, care must be taken in selecting cases, as fractured or broken teeth, teeth with advanced periodontal disease, and ankylosed teeth are not suitable for IR.^[4]

The success of IR depends on factors such as tooth anatomy, operator skill, and case selection, and it has a reported retention rate of 93% after 12 years.^[3,5] The key to success is minimizing extraoral dry time, careful manipulation, and atraumatic extraction of the tooth.

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This case report aims to present a successful case of IR and discuss the steps involved in the procedure and its outcomes. The case report provides valuable insights into the importance of IR in preserving mature teeth and highlights the need for specialized training and expertise in performing this procedure.

Case Report

A 15-year-old girl reported to the Outpatient Department of IGIMS, Patna, with a chief complaint of pain in the right lower back tooth region for 15 days [Figure 1]. The patient had a history of root canal treatment (RCT) in the mandibular right permanent second molar 1 month back.

On clinical examination, the tooth was tender on percussion, and radiographic examination revealed a separated instrument in the mesial root and periapical radiolucency on both, mesial and distal roots of the concerned tooth.

The patient was presented with all available treatment options, including extraction and replacement, retreatment and restoration, periradicular surgery, and IR with root-end filling. The pros and cons of each option were explained in detail, and written informed consent was obtained from the patient.

How to cite this article: Kumar G, Biswas KP, Mishra N. Bridging the gap between endodontic failure and success: A case report on intentional replantation. *Contemp Clin Dent* 2024;15:67-70.

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Submitted : 20-Mar-2023
Revised : 27-Jan-2024
Accepted : 09-Feb-2024
Published : 23-Mar-2024

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Access this article online

Website:
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DOI: 10.4103/ccd.ccd_134_23

Quick Response Code:



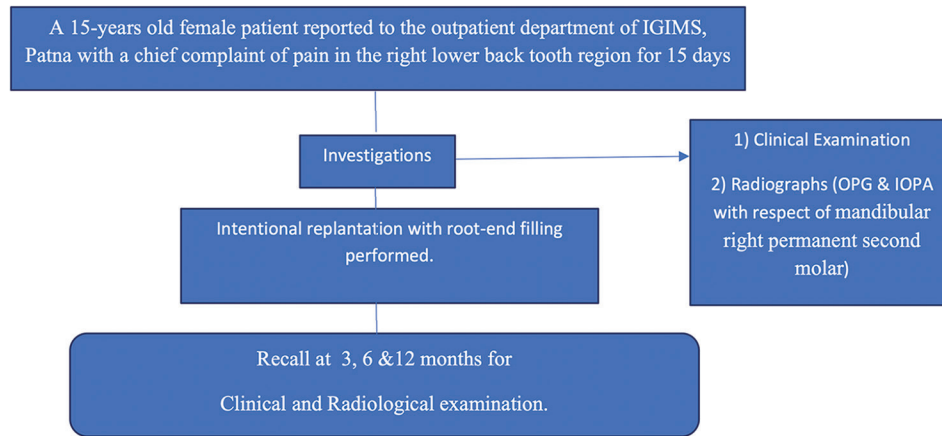


Figure 1: Chronological flowchart of case report timeline illustrating the key milestones and events in the progression of the case report. OPG: orthopantomogram, IOPA: intraoral periapical

IR was ultimately chosen due to the patient's desire to avoid surgery and the need for adequate endodontic treatment. The presence of a separated instrument fragment past the apical foramen and the chances of it getting pushed into the periapical tissue also contributed to the decision to select IR.

Before the procedure, the patient received 400 mg of ibuprofen to reduce postoperative pain and a 0.2% chlorhexidine rinse to control oral bacteria. The tooth was extracted using forceps and evaluated under a microscope. During the extraoral period, the periodontal tissue was rinsed with a sterile saline solution, and the alveolus was cleared of inflammatory tissue. The fractured instrument was gently removed, and RCT was performed. The root end was then resected and sealed with Biodentine (Septodont, Saint-Maur-des-Fossés, France). The coronal restoration was done with composite resin (Tetric N-Ceram; Ivoclar Vivadent AG, Schaan, Liechtenstein). The tooth was replanted and secured with a fiber splint (Ribbond Inc., Seattle, WA, USA), and the occlusion was adjusted to ensure proper placement. An intraoral X-ray confirmed proper repositioning and root-end filling. The splint was removed after 2 weeks.

The patient was recalled at the end of 3, 6, and 12 months. A clinical examination was performed at each interval. In addition, a radiographic assessment for the resolution of periapical radiolucency was performed at the end of 12 months.

The patient remained asymptomatic during the 3-month, 6-month, and 12-month follow-ups. On clinical examination, the tooth was nontender on percussion without any signs of edema or swelling and any abnormal mobility. On periapical radiographs at 12-month follow-up, a significant reduction in periapical radiolucency was seen [Figure 2].

Discussion

IR may provide an effective alternative where nonsurgical RCT has failed and surgical treatment is contraindicated.^[2]

This procedure becomes particularly crucial in scenarios involving complex anatomical variations, inaccessible root canals, or instances where retreatment options are limited. By allowing for the extraction, meticulous manipulation outside the oral cavity, and subsequent replantation of the tooth, IR offers a controlled environment for thorough cleaning, disinfection, and resolution of persistent issues.^[3,5] In the present case, endodontic treatment was incomplete, with a fractured instrument detected in the mesial root. Considering the extrusion of the fractured instrument beyond the confines of the root canal, the lingual inclination of the tooth with a thick buccal cortical plate of the mandibular second molar, and proximity to the inferior alveolar nerve canal, IR was planned to be done in the present case.

IR involves careful tooth extraction from its socket using forceps placed above the cemento-enamel junction to avoid any damage to the root surface. The extraction should be atraumatic, and the cortical plates should be left intact.^[1,4] In the present case, an experienced oral surgeon performed an atraumatic extraction using forceps. Further, the tooth was held from the crown during the entire procedure to avoid damage to the periodontal ligament.

Many materials have been used for root-end filling, such as amalgam, super ethoxy benzoic acid (EBA), and gutta-percha,^[6] but lately, mineral trioxide aggregate (MTA) and Biodentine have proven to be promising options due to their good sealing ability, biocompatibility, and ability to enhance healing.^[7] Biodentine was used in this case as the root end-filling material because of its better handling properties and shorter setting time.^[8]

The main causes of failure in replanted teeth are external root resorption and ankylosis.^[5,9] Among the various factors affecting the long-term outcome of IR, extraoral time is crucial.^[4] To maintain the viability and integrity of periodontal ligament (PDL) cells, extraoral time

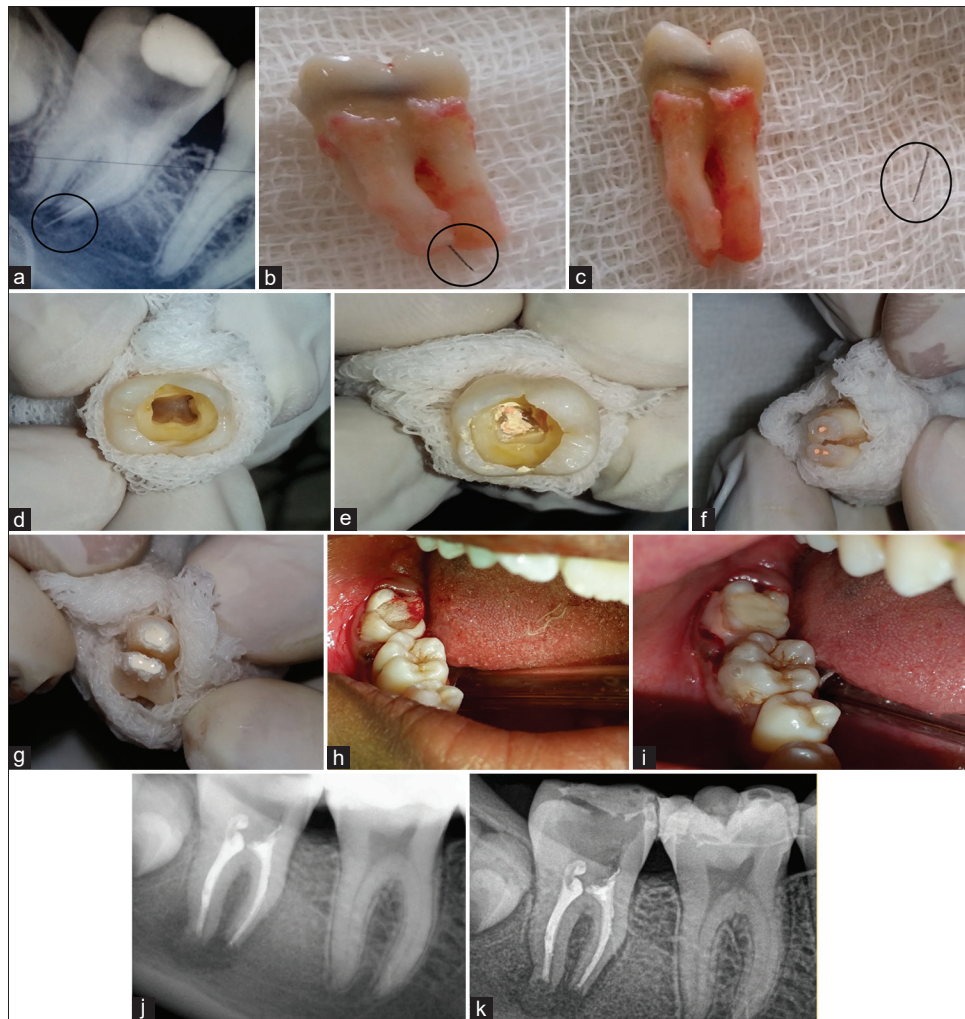


Figure 2: Sequential stages of endodontic intervention in a mandibular right permanent second molar with a separated instrument. (a) Preoperative radiograph revealed a fragment of a separated instrument (inside the circle) in the mesial root. (b) Tooth after intentional extraction. Separated instrument fragment (inside the circle) can be seen projecting from the apical foramen of mesial root. (c) Tooth after removal of the separated instrument (inside the circle) from the root canal. (d) Access cavity refined. (e) Root canal preparation and obturation completed. (f) Apicoectomy performed. (g) Biodentine retrofilling completed. (h) Tooth replanted. (i) Fiber splint applied on the tooth. (j) Immediate postoperative radiograph. (k) One-year follow-up radiograph showing resolution of periapical radiolucency

should be kept to a minimum. An extra-alveolar time of over 15 min can lead to root resorption and negatively impact the outcome.^[3,10] The success in the present case can be attributed to keeping the extraoral time within the prescribed limit.

The tooth was stabilized in its socket with a fiber splint, and the patient was instructed to bite on a piece of gauze to help control bleeding.^[11] The tooth was then covered with a protective dressing, and the patient was advised to avoid biting and chewing on the affected side for 48 h and to follow a soft diet for 2 weeks to allow the tissues to heal. The results of the procedure in this case were successful, with no complications or adverse events reported. The patient had a good response to the IR procedure and was able to maintain the affected tooth for a 1-year follow-up.

This case report highlights the importance of IR in endodontics and its potential to preserve mature teeth that

would otherwise need to be extracted. IR can provide a cost-effective and esthetically pleasing solution for patients with mature teeth affected by apical periodontitis.^[12] The thorough description of the procedure, from patient selection through postoperative follow-up, is one of this case report's main strengths. Clinicians considering using IR as a therapeutic option would greatly benefit from a thorough explanation of the procedures involved.

However, it is critical to recognize the limitations of this case report. First of all, because it is a single-case report, it might not accurately reflect how generalizable the results found are. The inability to compare IR to other treatment modalities or use a control group prevents firm conclusions on IR's superiority. Furthermore, the 12-month follow-up period may not have adequately captured long-term results or possible issues that might develop after this time. Cho *et al.* suggested that follow-up in such cases must

be extended at least 3 years for proper monitoring of late complications impacting long-term healing.^[5] Further studies with larger sample sizes and longer follow-up periods are needed to provide more robust evidence on the efficacy and long-term success of IR. Furthermore, it is important to note that IR is a complex procedure that requires specialized training and should only be performed by an experienced endodontist.^[3]

In terms of the patient's perspective, IR is beneficial to patients in a number of ways. It offers a chance to keep a natural tooth, which is frequently preferred for aesthetic and practical reasons. Second, compared to other therapies such as implant insertion, which can be expensive, IR might be a more economical choice. IR may also be seen by some patients as less frightening and more comfortable because it does not require any invasive surgical procedures. To enable shared decision-making and reasonable expectations, it is crucial for clinicians to fully inform patients of the possible dangers, advantages, and alternatives of IR.

It is important to note that further studies are needed to evaluate the long-term outcomes of IR in endodontics and to compare it to other treatments for mature teeth affected by apical periodontitis. In addition, research into the factors that contribute to the success or failure of IR could lead to improved techniques and better outcomes for patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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