



Intentional Replantation for the Management of Tooth with Separated Instrument beyond the Apex: A Case Report

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ABSTRACT: Intentional replantation is a viable therapeutic approach for managing teeth with apical complications, particularly when traditional endodontic treatments are unsuccessful. This case report explores the management of a tooth with a separated endodontic instrument beyond the apex using intentional replantation. A 32-year-old female presented with a mandibular molar exhibiting a pain, RCT was followed while doing BMP, instrument separated and was located beyond the apical foramen, resulting in pain. After thorough evaluation, the decision was made to extract the tooth, perform intentional replantation, and remove the fractured instrument under controlled conditions. The procedure was successfully completed, and the tooth was reimplanted after careful debridement and disinfection. Follow-up radiographic and clinical evaluations demonstrated resolution of symptoms. This case highlights the effectiveness of intentional replantation as a treatment modality for managing teeth with separated instruments beyond the apex, offering an alternative to tooth extraction and implant placement, and underscoring the importance of preserving natural dentition whenever possible.

KEYWORDS:

Intentional replantation, separated instrument, apex, LA, root canal therapy, case report, reimplantation technique, mandibular molar, MTA, Retrograde filling, apical foramen.

I. INTRODUCTION

Root canal treatment or endodontic therapy is a dental procedure that removes infected or inflamed pulp from a tooth to relieve pain and prevent the need for extraction.

Endodontic procedure involves gaining the access to the root canal system, the extirpation of the pulp tissue, followed by disinfection, instrumentation, and irrigation of the contaminated

root canals using specialized files and irrigants, and subsequently obturating the canals with a biocompatible filling material to achieve a hermetic seal.

Instrument separation is a common error in endodontic procedures, usually caused by fatigue, torsional failure, or corrosion. Fatigue failure occurs when the instrument is exposed to repeated stress, while torsional failure happens when the instrument twists, causing part of it to lock and the rest to keep rotating until it breaks. Corrosive failure results from a combination of torsional and fatigue failure along with corrosion. If an instrument fractures and the broken piece remains in the root canal, the best approach is to remove the fragment to avoid further complications.^[1]

When an instrument breaks and remains inside the root canal, it is often necessary to retrieve it to prevent further complications.

Intentional reimplantation described by Grossman in 1982, the intentional removal of a tooth and its reinsertion into the socket almost immediately after sealing the apical foramina^[2].

According to the Glossary of Endodontic Terms, intentional reimplantation is "the reinsertion of a tooth into its alveolus after it has been removed for the purpose of performing treatment, such as root end fillings or perforation repair."^[3]

In endodontic procedure, this intentional reimplantation is carried out to recover the separated instruments from the tooth, when no other procedure is viable.

This case report deals with a successful removal of a separated instrument that is overextended beyond the apex with the help of intentional replantation.

II. CASE REPORT

A 30-year-old female patient came to the clinic with the complaint of pain in the lower right



back tooth region. No contributing medical history. On intraoral examination, dental caries with tender on percussion present in 46 region. On radiographic examination, radiolucency involving enamel, dentin and pulp in 46 region with no abnormalities detected in the radicular region. Diagnosed as dental caries with apical periodontitis in 46 region.

Treatment planned was Root canal treatment in 46. Local anesthesia of 2% lignocaine with 1:80,000 adrenaline was injected as inferior alveolar nerve block on right side which anesthetise lower right molars, premolars, lower lip, right half of the tongue. After objective and subjective sign of the LA effect, root canal procedure was started. Dental caries removed, cavity refined, distal canal located, mesiobuccal and mesiolingual canals are located. Canals are negotiated using 10 size file. Radiograph was taken to determine the working length. DC: MB: ML:. Closed dressing was given.

On 2nd visit, biomechanical preparation(BMP) was started.S1 instrument was separated. On radiograph 3mm S1 instrument was separated on the apical 3rd of the MB canal which was over extended from the apex[Figure 1].Leaving the separated instrument in the canal, obturation was continued[Figure 2].Instrument separation was informed to the patient and explained about, leaving it untouched will not cause any much complication and also explained about different procedures to remove the separated instrument.Occlusal reduction and Temporary filling done

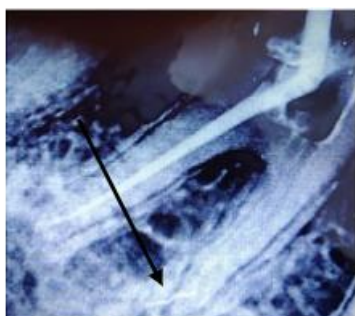


Figure 1: separated file in mesiobuccal canal



Figure 2: Obturation was continued

On next visit, patient had pain and discomfort while mastication. So, treatment of intentional reimplantation was planned. Informed consent of intentional reimplantation was made.

Local anesthesia of 2% lignocaine with 1:80,000 adrenaline was injected as inferior alveolar nerve block on right side. 46, right mandibular first molar was extracted atraumatically and aseptically without causing any damage to the bone and sound structure[Figure 3].



Figure 3: Extracted tooth socket

Around the root of the extracted tooth, connected granulation tissue was evident, and the instrument was overextended and detached beyond the apical foramen in the mesiobuccal canal. Using a universal curette, the granulation tissue was scraped away, and tissue forceps were used to remove the overextended file. To preserve the vitality of the periodontal ligament (PDL) the roots were covered with antibiotic paste, and Mineral trioxide aggregate (MTA) was used for retrograde filling and within 15 minutes, an extraoral root canal was performed[Figure 4].



Figure 4: Extracted tooth



The separated instrument's length was 3 mm.[Figure 5].



Figure 5: Broken File fragment[3mm]

After being cleaned with sterile saline, the tooth was placed back into its socket. After that, the tooth was sutured in a figure-of-eight, and a post-operative radiograph was taken to Verify the tooth's location[Figure 6 and 7].



Figure6: Post operative IOPA

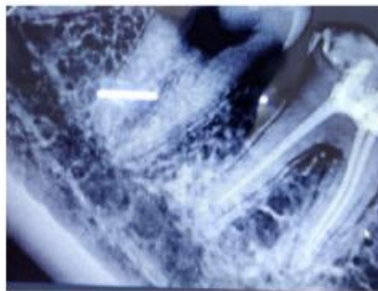


Figure 7: Post operative intraoral view

Follow up was done after 5 days, there were no radiological or clinical anomalies found[Figure 7]. The patient was instructed to maintain good oral hygiene and 0.12% CHX solution was prescribed to rinse twice daily for a week and asked to follow soft diet for 5 days. The suture was removed after 1 week. There were no clinical indications of pathologic movement or discomfort, and the tooth was stable in its socket. Periodic evaluation was done after 7 days, 1 month and 6 months(Figure 8 and 9).



Figure 8: Follow up clinical view

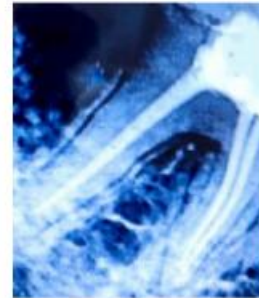


Figure 9: Follow up radiographic view

III. DISCUSSION:

Cleaning and shaping are two of the most crucial elements of endodontic therapy. Errors in the cleaning and shaping process can include ledging, zipping, canal perforation, canal transit, and instrument separation^[4].

Instrument separation is one of the common mishaps in root canal treatment, typically caused by improper technique, root canal curvature, calcified canals or mechanical failure of the instrument^[5].

Instrument separation beyond the apex during root canal treatment can be a challenging complication. When an instrument is separated and remains attached to the root apex, it can lead to several potential complications, including persistent postoperative pain due to irritation or inflammation around the separated instrument. The presence of debris or bacteria around the separated instrument can cause chronic inflammation or even abscess formation. It can obstruct proper canal cleaning and shaping, and incomplete sealing may lead to root canal failure. Additionally, it may act as a foreign body, causing cysts or granulomas, which could ultimately result in tooth loss.

Management options for separated instruments include nonsurgical retrieval, bypassing, or apicoectomy. Effective retrieval or management of separated instruments requires careful consideration of the anatomy and the stage of treatment when the instrument breaks.

Intentional reimplantation is a valuable approach, particularly for fragments located beyond the apex or in cases where removal is too



difficult. This method is most effective in molars with complex root systems and when other retrieval techniques are not viable. Success depends on selecting appropriate cases, minimizing extraoral time, and preserving PDL integrity.

Intentional replantation is advised in situations like unsatisfactory root canal therapy, trismus, anatomical constraints, difficulty with access, unintentional exarticulation, patients with operation objections, and developmental anomalies^[6].

The process is easy and uncomplicated when the right cases are chosen. According to Kratchman, it is the best option for patients with restricted access, anatomical restrictions, and perforations in accessible locations^[7].

When retrieval is attempted, the following factors must be taken into account: root length, curvature, dentine thickness, removal technique, fragment length, presence or absence of periapical radiolucency, and preparation stage at the time of instrument separation^[8].

In these, the tooth is selected because of its straight curvature of roots which will not cause much complication while extracting. Molar roots were covered with antibiotic paste to maintain PDL cell viability and to prevent tooth from resorption and ankylosis. For atraumatic extraction, the forcep's beaks should be positioned coronal to the cement-enamel junction, and elevators are not recommended. Extraoral time should be minimized because PDL cell drying takes at least eight minutes. The longer the extraoral period, the greater the chance of bony ankylosis^[9].

Several factors contribute to the success of intentional reimplantation, including minimizing the tooth's extraoral time.

According to Jang et al., keeping the tooth outside the socket for no more than 15 minutes can improve the likelihood of success^[10].

Sherman's 1968 study demonstrated that after intentional replantation, a normal periodontal ligament could be restored^[11].

Additionally, treatments such as using MTA for retrograde filling and applying an antibiotic paste to the root can enhance outcomes by promoting healing and reducing the risk of infection.

Ankylosis of the tooth can be avoided in large part by maintaining a healthy cementum on the root surface. Tetracycline, citric acid, and ethylenediaminetetraacetic acid (EDTA) are the solutions used to create a root surface that promotes cellular adhesion and growth. Tetracycline was administered to the root surfaces in this case in order to promote periodontal

ligament fiber adhesion and prevent tooth from ankylosis^[12].

According to Messkoub, retention rates for replanted teeth range from 52% to 95%^[13].

IV. CONCLUSION:

In the cases of endodontic failure or trauma, separated instrument in the root canal, purposeful reimplantation of a tooth may be a successful therapeutic choice. Although it presents a chance to save the tooth, difficulties must be carefully managed, especially when working with separated instrument. Appropriate diagnosis, efficient handling of the separated instrument, and accurate reimplantation technique are necessary for successful results. To guarantee the tooth's longevity and avoid problems like infection, root resorption, or failure of reattachment, careful post-operative monitoring is also necessary. In difficult dental cases, deliberate reimplantation can help achieve positive clinical outcomes with the right methods and patient selection.

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