

Intentional replantation of a mandibular second molar with atypical internal apical morphology: A case report

Reimplante intencional de un segundo molar mandibular con morfología apical interna atípica: Informe de un caso

Henry Paul Valverde Haro

National University of Chimborazo, Ecuador

University of Grande Rio (UNIGRANRIO), Brasil

ENDOsolutions Research Group, Ecuador

endosolutionsec@gmail.com

 <https://orcid.org/0000-0003-2901-8928>

Pablo Andres Parra Martinez

National University of Chimborazo, Ecuador

 <https://orcid.org/0000-0002-3896-3684>

Adriana Denisse Erazo Conde

ENDOsolutions Research Group, Ecuador

 <https://orcid.org/0009-0001-8194-9116>

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Abstract

Periodontitis after endodontic treatment is mainly caused by a persistent bacterial infection at the root canal level and in the periradicular tissues. However, there is a 5% to 15% prevalence where bacteria can persist in adequate endodontic treatments that are generally caused by atypical internal morphologies that prevent the access of instruments and antimicrobial irrigating agents to areas with anatomical difficulty. This article describes a clinical case of a mandibular second molar with an atypical apical internal morphology, which presented symptoms associated with canal filling in its first intervention. The tooth was immediately reimplanted intentionally and fixed with an X-shaped suture for two weeks. Appropriate intervention with intentional replantation resulted in the resolution of symptoms and healing of periradicular tissue with clinical and radiographic follow-up for two years.

Keywords: Non-vital tooth, retreatment, endodontics, root canal preparation.

Resumen

La periodontitis apical después del tratamiento endodóntico es causada principalmente por una infección bacteriana persistente a nivel del conducto radicular y en los tejidos perirradiculares. Sin embargo, existe una prevalencia del 5 % al 15 % en donde las bacterias pueden persistir en tratamientos endodónticos adecuados que son generalmente causados por morfologías internas atípicas que impiden el acceso de los instrumentos y agentes irrigantes antimicrobianos a las zonas con dificultad anatómica. Este artículo describe un caso clínico de un segundo molar mandibular con una morfología interna apical atípica, que presentó síntomas asociados a la obturación del conducto en su primera intervención. El diente se reimplantó inmediatamente de manera intencional y se fijó con una sutura en forma de X durante dos semanas. La intervención adecuada con el reimplante intencional dio como resultado la resolución de los síntomas y la curación del tejido perirradicular con el seguimiento clínico y radiográfico durante dos años.

Palabras clave: diente no vital, retratamiento, endodoncia, preparación del conducto radicular.

Apical periodontitis after endodontic treatment is mainly due to a persistent bacterial infection at the root canal level and in the periradicular tissues. ^(1,2,3) These bacteria have been widely studied and identified by cultures and advanced molecular methods. ⁽⁴⁾ Therefore, the persistence of this disease is due to the accumulation of bacteria in pathogenic biofilms in specific spaces of the root canal and is associated with inflammatory reactions, extreme pain, abscess formation, and odontogenic cellulitis. ⁽⁵⁾ However, there is a prevalence of 5% to 15% of teeth in which bacteria can persist after adequate endodontic treatments, which are generally due to atypical internal morphologies, such as apical branches, lateral canals, isthmuses, and curvatures that prevent the access of instruments and antimicrobial irrigating agents to these areas with anatomical difficulties. ^(6,7)

Endodontic instruments shape and clean the main canal, and it has been shown that due to root anatomy and instrument characteristics, there are areas of the canal that are not contacted and fail to achieve proper root canal obturation. ⁽⁸⁾ Microcomputer tomography studies have reported 10-50% unprepared surfaces in small root canals, so root canal cleaning and shaping is always a challenge for even the most experienced clinician. ⁽⁹⁾

Symptoms of such pathologies may be related to the lack of space in the canal system for the inflammatory exudate to filter and relieve periapical intratissue pressure. ⁽¹⁰⁾ Intentional replantation is an alternative surgical treatment that addresses complex anatomies by resecting the apical 3 mm, with favorable prognoses reaching 95% success if modern endodontic surgical principles are used. ⁽¹¹⁾ Today, translational dentistry is an essential vision for contemporary clinical practice, as it allows the transfer of science to the clinic and thus preserves dental organs and surrounding tissues. The intentional replantation presented in the clinical case meets the standards accepted by current literature, where a fundamental step is appropriately managing the structures without compromising function and aesthetics. Therefore, this article describes clinical apical periodontitis following primary root canal treatment. An atypical internal morphology of apical branches was observed in the apical portion, which caused symptoms when chewing.

CASE PRESENTATION

This clinical case has been written following the recommendations for endodontics (PRICE) 2020 case reports. ⁽¹²⁾ A 37-year-old female patient of Ecuadorian nationality with no significant medical or dental history, either personal or family. She came to the consultation due to constant pain at the level of tooth 37. The patient reported that she had undergone endodontic treatment approximately one month ago, with symptoms associated with chewing. The initial radiograph showed that the endodontic treatment was in good condition, and the apical portion had apical deltas sealed with obturating material. The diagnosis was post-treatment apical periodontitis. Since the anatomical difficulties in the apical part could lead to failure of non-surgical retreatment, the patient accepted the proposed treatment plan. After signing the informed consent, the intentional reimplantation procedure was carried out.

An extraction was performed with an atraumatic surgical elevator kit, and the tooth was luxated until avulsion was achieved. A Zekrya bur was used to trim the apical 3 mm of the tooth. The apical defiling was performed with an ultrasonic diamond tip until 3 mm of retropreparation of the canal was achieved. The periodontal ligament fibers were hydrated with irrigation through a saline syringe, and the remains of gutta-percha were removed. The retro-prepared space was dried with sterile paper cones and the bioceramic material (BioC Repair, Angelus, Londrina). The bioceramic material was then packed, and the excess was removed with a small sterile applicator on the root surface, irrigating it with saline to hydrate the periodontal ligament fibers and remove any remaining bioceramic material. The tooth was immediately replanted intentionally and fixed with an X-shaped suture for two weeks. A flowable resin was placed on the occlusal surface to improve suture retention.

A periapical radiograph was taken immediately after reimplantation, and the suture was removed fifteen days after the procedure. At the monthly control of the intentional reimplantation, there was no mobility. The patient was satisfied with the immediate results of the treatment and was advised of the importance of post-endodontic rehabilitation and continued follow-up. Radiographic follow-up controls showed bone repair in the area where the root resection was performed after six months, one year, and two years. The patient remained asymptomatic.

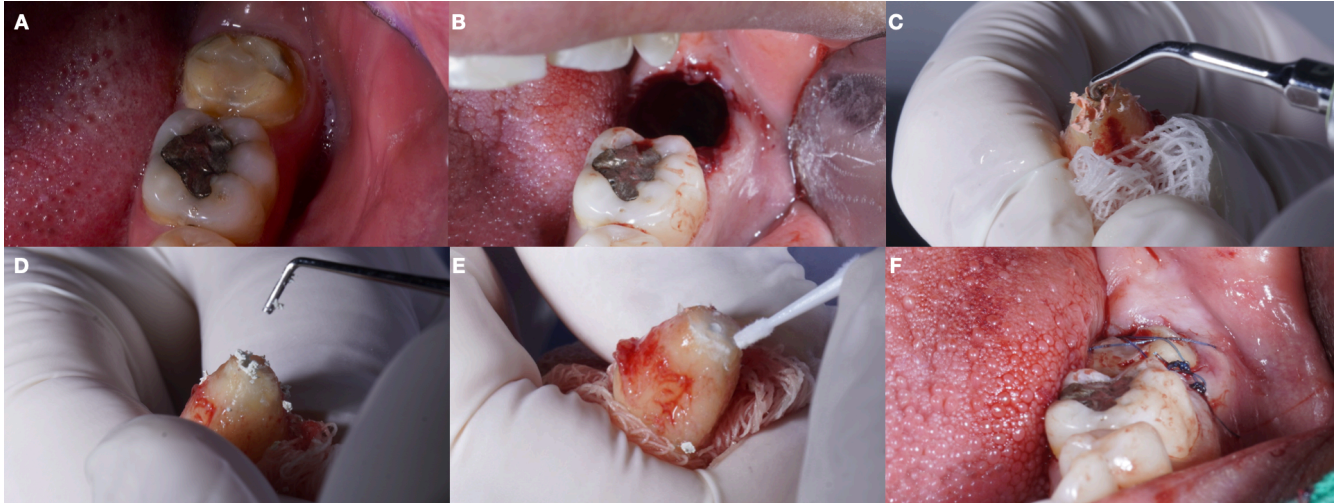


Figure 1. – A. Intraoral photograph – B. Alveolus after atraumatic extraction – C. Retropreparation with ultrasonic tip – D. Retrofilling with bioceramic material – E. Cleaning of excess retrofilling material – F. Reimplantation and fixation with X-suture.

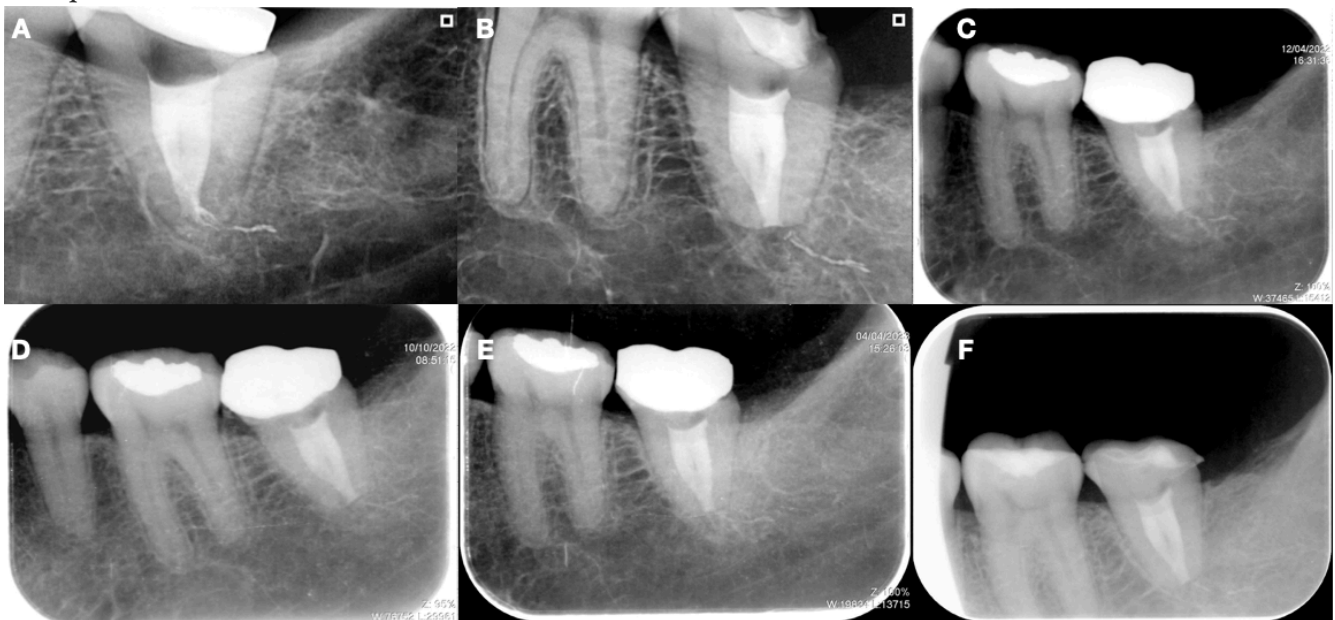


Figure 2. – A. Initial periapical radiograph – B. Immediate periapical radiograph after reimplantation control – C. Periapical radiograph after one month after reimplantation control – D. Periapical radiograph after six months after reimplantation control – E. Periapical radiograph after one year after reimplantation control – F. Periapical radiograph after two years after reimplantation control.

DISCUSSION

Intentional reimplantation is not a novelty, and since the first case reports ⁽¹³⁾, it is considered the last surgical option for preserving teeth with a poor endodontic prognosis. ⁽¹⁴⁾ It has been demonstrated to be effective in solving problems of endodontic origin in areas of difficult surgical access, in the presence of anatomical difficulties, in patients taking bisphosphonates, and in patients who do not respond favorably to primary endodontic treatment. However, It is not a routine procedure, and the periodontal ligament must be preserved so that the tooth's proprioceptive property is not lost. ⁽¹⁶⁾ The reason for intentional reimplantation in this case was that the tooth did not respond to primary endodontic treatment.

In all replantation procedures, an intentional replantation procedure should be performed, carried out in the shortest possible time, and a moist environment to preserve the viability of the periodontal ligament cells. ⁽¹⁷⁾

Andreasen et al. ⁽¹⁸⁾ reported that periodontal healing is impaired when alveolar extra time exceeds 5 minutes. Lauridsen et al. ⁽¹⁹⁾ demonstrated a 59.4% prevalence of external root resorption in cases where alveolar extra time exceeds 20 minutes. Therefore, it is suggested that the extra-alveolar time of the replanted tooth should not exceed 15 minutes, and that tooth preservation should be carried out under external humidity conditions with a large amount of saline irrigation, which positively affects the results of intentional replantation. ^(15, 17)

This case report demonstrates the efficacy of this surgical endodontic technique by the results obtained in the two years of follow-up, with the absence of clinical symptoms and the stability of the tissues adjacent to the reimplanted tooth in the clinical and radiographic controls. These results agree with the previously reported clinical cases in which a high success rate has been demonstrated, with follow-up periods ranging from two to twenty years. ^(20,21,22,23,24,25)

The main limitations of this case report were not being able to perform a non-surgical retreatment due to the apical anatomical difficulty presented by the molar and not being able to perform a surgical intervention due to the healthy vestibular cortex that the patient had, a limitation that was overcome by performing the intentional reimplantation.

This case report deals with a single-rooted posterior tooth. According to Plotino and colleagues ⁽¹⁷⁾, no significant differences in the survival rates of intentional replantation between single-rooted and multi-rooted teeth were found. Therefore, the number of roots of the replanted teeth does not significantly impact the results of the intentional replantation process. However, attention should be paid to possible anatomical alterations of the root of the treated tooth that may prevent the execution of the atraumatic extraction process. ⁽²⁶⁾ Another important point is the use of technology in intentional replantation treatments, such as ultrasonic devices or the operating microscope, which positively influenced the extra-alveolar stay time and improved the treatment results by reducing the duration of the intentional replantation procedure, the invasiveness of the procedure, and the failure rates. ⁽²⁷⁾

In the root resection process, the apical 3 mm with a high-rotation drill of the Zekrya type was removed. In previous studies, Grossman ⁽²⁸⁾ used rongeur forceps to remove the apical third, while Emmertsen and Andreasen ⁽²⁹⁾ used carbide discs in their research on root resection. On the other hand, Bender and Rossman ⁽³⁰⁾ used diamond discs and stones for this procedure. Therefore, 3 mm resection is recommended to remove 98% of all apical branches and 93% of lateral canals. Failure to remove these canals altogether may lead to treatment failure in the future. ^(31, 32)

Another critical stage of the intentional replantation procedure is retrograde sealing. The present case report used a premixed bioceramic (BioC Repair, Londrina, Brazil), which is a reformulated material with an easy-to-handle consistency that has hydrophilic characteristics that allow its use in operating environments with blood contamination, resulting in an optimization of working time and more significant long-term

stability. ⁽³³⁾ A Study has determined that this material also has genocompatibility and is not cytotoxic in osteoblastic cells. ⁽³⁴⁾ Abrao et al. ⁽³⁵⁾ have used mineral trioxide aggregate (MTA) cement for several years, chosen for being biocompatible, osteoinductive, and antimicrobial, with excellent sealing power, dimensional stability, hardness, and slight expansion. However, MTA has some negative characteristics, such as staining of dentin, difficulty in mixing due to its sandy consistency, which can cause waste of the material, and poor dispersion, which causes high porosity. ⁽³⁶⁾

Regarding follow-up, in the present case, the bone remodeling process is continuously observed from six months to two years of follow-up. This is a favorable point for the success and the periapical health status of the tooth treated with intentional reimplantation. Javed et al. ⁽³⁷⁾ mention that from twelve months onwards, it is possible to identify the survival or healing of the lesions associated with intentional reimplantation for a follow-up period of three to four years, during which the complete neoformation of bone tissue in the apical region is observed.

CONCLUSIONS

This case report presents an unusual case of a mandibular second molar with an atypical apical internal morphology that exhibited symptoms associated with canal obturation at its first intervention. Following the appropriate intervention, which consisted of intentional replantation, the symptoms resolved, and the periradicular tissue healed, as reflected by clinical and radiographic follow-up.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

CONTRIBUTION

Conceptualization: HP Valverde, AD Erazo. Analysis of clinical data, execution of treatment, performed radiographic examinations, and interpretation of imaging findings: HP Valverde. Formal analysis of literature: HP Valverde, PA Parra, AD Erazo. Writing of the original draft: HP Valverde, PA Parra, AD Erazo. Review and editing of writing: HP Valverde, AD Erazo.

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