EAS Journal of Dentistry and Oral Medicine
Abbreviated Key Title: EAS J Dent Oral Med
ISSN: 2663-1849 (Print) & ISSN: 2663-7324 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-8 | Issue-2 | Mar-Apr-2026 | DOI: https://doi.org/10.36349/easjdom.2026.v08i02.005

Case Report

Orthograde Retreatment of a Maxillary Right Central Incisor with Inadequate Root Filling: Clinical Case Report

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Article History
Received: 28.01.2026
Accepted: 23.03.2026
Published: N/A

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: Orthograde root canal retreatment is the first-line conservative option when endodontic failure or risk of reinfection is present after prior treatment. We report the management of a maxillary right central incisor (tooth 11) in a 59-year-old male, asymptomatic, with a misfitting metal-ceramic crown placed ~30 years earlier, a cast metal post, and an inadequate root filling. Under rubber-dam isolation, recurrent caries were removed and complete gutta-percha removal was performed. Working length was established at 17 mm, followed by biomechanical instrumentation and activated irrigation with 5.25% sodium hypochlorite and 17% EDTA, alternated with saline. Calcium hydroxide was used as an intracanal medicament at the first visit; at the subsequent appointment, three-dimensional obturation was achieved using cold lateral and vertical compaction with gutta-percha and a bioceramic sealer (MTA Fillapex). A provisional seal was placed and definitive restoration was planned immediately to prevent coronal leakage. Immediate postoperative evolution was uneventful, without pain or swelling. As no evident periapical lesion was observed, the prognosis was considered favorable and consistent with reported success rates when effective disinfection and adequate corono-apical sealing are achieved. This case underscores the importance of identifying etiologies correctable via an orthograde approach, implementing standardized irrigation protocols, ensuring early coronal coverage, and coordinating prosthetic rehabilitation in a multidisciplinary manner to preserve structure and function. Clinical and radiographic follow-ups at 6 and 12 months, and annually thereafter, are recommended to document retreatment success. Coordination with periodontics and prosthodontics optimizes definitive rehabilitation.

Keywords: Endodontic Retreatment, Endodontic Failure, Inadequate Obturation, MTA Fillapex.

INTRODUCTION

Endodontic therapy aims to eradicate infection from the root canal system and resolve periapical alterations to preserve the tooth functionally within the dental arch. Despite advances in techniques and materials, endodontic failure remains frequent, with reported rates of 10–30%, mainly attributable to persistent intraradicular microbiota, anatomic complexity, or deficiencies in root filling and coronal restoration. In such scenarios, orthograde retreatment is a conservative therapeutic alternative and the procedure of choice when structural and periodontal conditions are favorable. It enables re-entry into the canal system to remove filling materials, improve disinfection, and achieve an adequate three-dimensional seal to restore function (Sabeti *et al*., 2024).

Multiple studies support the efficacy of this modality. Sabeti *et al*., (2024) reported 75–90% success in nonsurgical retreatments using contemporary irrigation techniques and bioceramic sealers, while Ng, Mann & Gulabivala (2011) concluded that the quality of the apical seal and the coronal restoration are decisive for long-term success. Likewise, Torabinejad *et al.,* (2023)

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emphasize that proper canal management and elimination of residual microbial load are key to preventing recurrence.

This report describes an orthograde retreatment in a maxillary central incisor previously treated three decades earlier, highlighting clinical reasoning, a conservative approach, and contemporary disinfection and obturation techniques. The focus is to underline nonsurgical retreatment as a viable alternative to apical surgery, emphasizing its predictive value for preserving dental structures and restoring function.

The novelty of this case lies in combining a modern obturation technique using the bioceramic sealer MTA Fillapex with an optimized irrigation protocol (sequential 5.25% sodium hypochlorite and 17% EDTA), enabling efficient cleaning and sealing and illustrating the potential of contemporary conservative strategies to resolve prior failures.

Case Report

A 59-year-old retired male presented to the Graduate Program in Integral Endodontics, School of Dentistry, Mexicali (UABC), reporting "the front tooth crown fell out." Medical history included type 2 diabetes mellitus and hypertension, both medically controlled with sitagliptin-metformin (50/850 mg) and telmisartan (80 mg). He denied toxic habits and reported regular exercise. ASA physical status: II (controlled systemic disease). Asymptomatic; VAS = 0. Clinically, tooth 11 had a misfitting metal-ceramic crown and a cast metal intraradicular post, with no mobility and no sinus tract (Figure 1).

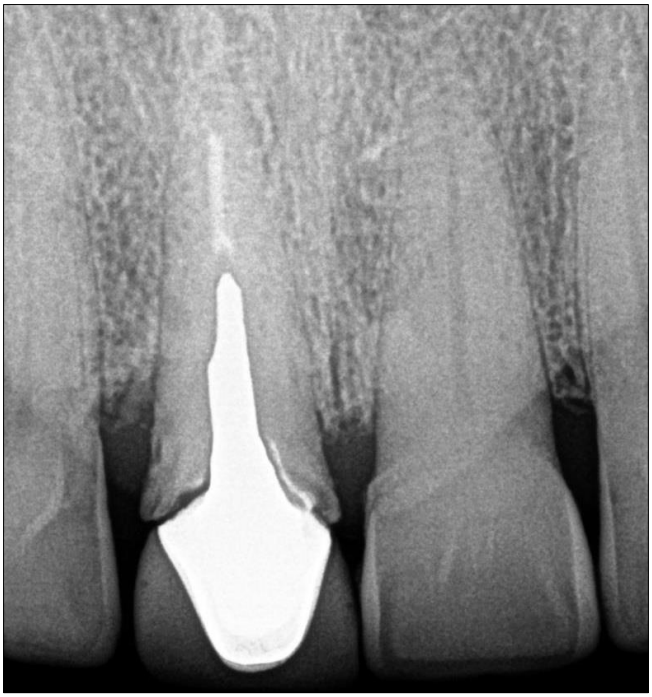

Figure 1: Initial periapical radiograph

Radiographically, trabecular bone morphology was appropriate for the region, with mild-to-moderate crestal bone loss. The periodontal ligament space was unremarkable, indicating no significant inflammation of the supporting tissues. A radiopaque area was noted in the coronal and middle thirds of the root, compatible with previous canal filling material, a cast metal post, and a metal-ceramic crown; a radiolucency in the coronal third suggested misfit, coronal leakage, and caries (Figure 1). Pulpal diagnosis: previously treated tooth; periapical diagnosis: apparently healthy periapical tissues (Glickman, 2009).

Treatment Plan: orthograde root canal retreatment; prognosis: favorable.

First visit. Under local anesthesia with 2% mepivacaine with epinephrine 1:100,000 (supraperiosteal technique) and rubber-dam isolation (NicTone; clamp No. 9, Fiesta), the endodontic access was re-shaped; recurrent caries and restorative material were removed.

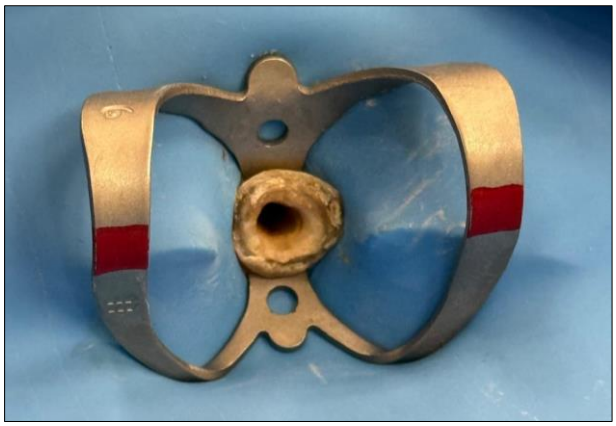

Figure 2: Chamber access under isolation.

Previous intraradicular filling material was completely removed using first- and second-series Hedström files (Mani). Irrigation was performed with 5.25% sodium hypochlorite, 17% EDTA, and 0.9% saline interspersed. Working length was established at 17 mm using a #15 K-Flex file (Mani) with a J. Morita Root ZX mini apex locator and confirmed radiographically (Figure 3).

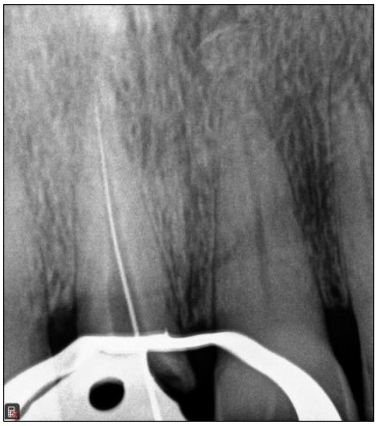

Figure 3: Working-length radiograph.

Intracanal Medication: ULTRACal™ XS calcium hydroxide; 7-day interval.

Second visit. Final obturation was completed with gutta-percha (Hygienic): master cone #55 plus accessory cones (medium-fine, MF; fine-fine, FF) and MTA Fillapex bioceramic sealer, using cold lateral and vertical compaction (Figure 3a, master cone trial; 3b, accessory cone bundle test; 3c, obturated tooth). A sterile PTFE pellet and provisional seal (Provisit) were placed.

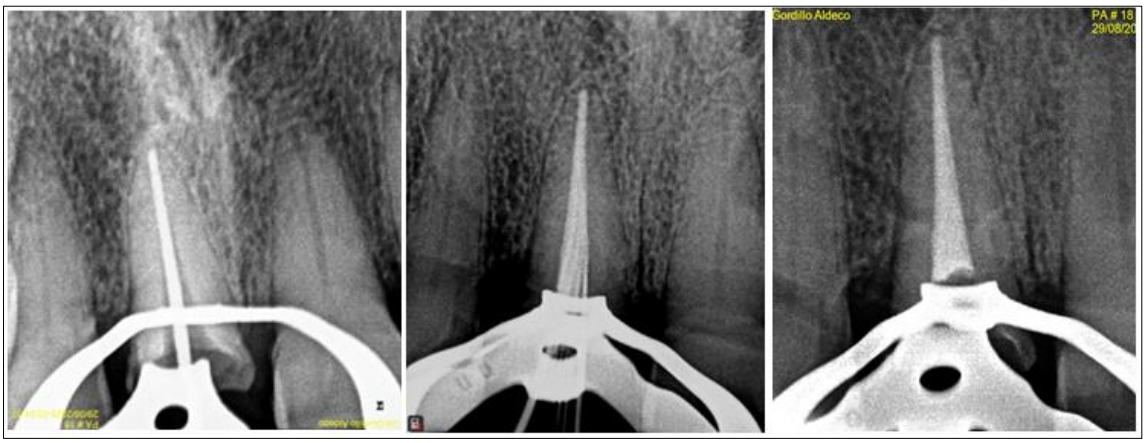

Figure 3: Final obturation: (a) master cone trial; (b) accessory cone bundle test; (c) obturated tooth.

Postoperative radiographic control showed a homogeneous fill of adequate length (Figure 3c), with no intraoperative complications and a favorable prognosis. Clinical and radiographic reviews at 3 and 6 months were recommended. The patient was referred to prosthodontics and periodontics for definitive rehabilitation.

DISCUSSION

This case demonstrates that orthograde retreatment remains an effective, conservative option for endodontic failure when structural and periodontal conditions are favorable. Here, the absence of active periapical pathology and sound root structure supported a conservative retreatment.

The favorable clinical and radiographic outcome after complete removal of filling material, disinfection with 5.25% NaOCl and 17% EDTA, and three-dimensional obturation with MTA Fillapex underscores the relevance of a modern protocol grounded in biocompatibility and effective canal disinfection (Zehnder, 2006; Torabinejad *et al*., 2023).

From a clinical perspective, using MTA Fillapex as a bioceramic sealer favors apical sealing, bioactivity, and controlled calcium-ion release, promoting periapical repair (Torabinejad *et al*., 2023). This behavior supports its potential as a material of choice in retreatments aimed at enhancing periapical healing and minimizing microleakage.

Regarding disinfection, sequential NaOCl and EDTA enabled effective cleaning and smear-layer removal. Future studies may assess ultrasonic or photodynamic activation in similar cases to optimize bacterial reduction and long-term outcomes (Mustafa *et al*., 2021).

Although limited to a single case, our findings align with current evidence: when the cause of failure is accessible orthogradely and a rigorous protocol of disinfection and corono-apical sealing is executed, nonsurgical retreatment can equal—or even surpass—apical surgery in structural preservation and prognosis (Bucchi *et al*., 2023; Sabeti *et al*., 2024). Notably, recent literature shows that preoperative periapical status strongly conditions outcomes: in teeth without apical lesions or only small radiolucencies, orthograde retreatment achieves high healing rates (~80–90%) over 2–3 years (Olivieri *et al*., 2023), whereas in established apical periodontitis, initial success is lower (~65% at first recall), especially with larger lesions (Stueland *et al*., 2023). These data support our approach: in the absence of active periapical disease, strict infection control and sealing justify anticipating a favorable prognosis (Olivieri *et al*., 2023; Sabeti *et al*., 2024).

In parallel, the quality and timeliness of coronal sealing are independent determinants of endodontic success. The classic study by Ray and Trope (1995) showed that a high-quality coronal restoration exerts an even greater impact than the technical quality of the root filling on periapical status, justifying early definitive rehabilitation to minimize recontamination and maximize healing probability.

CONCLUSIONS

In this case, complete removal of previous filling material, effective irrigation with 5.25% NaOCl and 17% EDTA, and obturation with MTA Fillapex achieved an adequate three-dimensional seal and a favorable prognosis. Medium-term clinical and radiographic follow-up is essential to confirm stability and success. Continuity of restorative treatment is likewise crucial to the overall success of the case.

This report reinforces the importance of comprehensive clinical reasoning, updated disinfection protocols, and biocompatible materials as pillars of contemporary endodontic retreatment success. In our view, success hinges on technical precision, appropriate material selection, and individualized case assessment. Longitudinal clinical research comparing bioceramic sealers and irrigation protocols is encouraged to optimize strategies in complex retreatments.

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Cite This Article: Greter Campo-Santalla, Claudia Lisette Saavedra-Martínez, Dulce Martha Fuchen-Ramos, Nahir Alejandro Naranjo-Cintora (2026). Orthograde Retreatment of a Maxillary Right Central Incisor with Inadequate Root Filling: Clinical Case Report. *EAS J Dent Oral Med, 8*(2), 76-80.