Revista
ESTOMATOLÓGICA
Herediana
E-ISSN 2225-7616

CASE REPORT

DOI: https://doi.org/10.20453/reh.v35i4.6435

Endodontic microsurgery using NeoPutty® as a retrograde filling material: a case report*

Claudia Fernanda Carbajal Pimentel[1],
Eduardo Luis Carlos Deza Napurí[1],
Armida Álvarez Montalván[1],
Martin Manuel Vargas Acevedo[1]

[1] Universidad Peruana de Ciencias Aplicadas. Lima, Peru.

ABSTRACT

Apical periodontitis is a chronic inflammatory condition of the periradicular tissues that occurs predominantly in previously endodontically treated teeth. Endodontic microsurgery is a specialized procedure that involves resection of the apical portion of the root, retrograde cavity preparation, and sealing with a retrograde filling material to promote periapical healing. This report describes the case of a patient whose tooth #14, previously treated for asymptomatic apical periodontitis, underwent endodontic microsurgery using the bioceramic material NeoPutty® as the retrograde filling material. At 12-month follow-up, the patient remained asymptomatic, with radiographic evidence of periapical repair and bone formation over the bioceramic material. This case suggests that endodontic microsurgery in a tooth with a post and apical periodontitis may be associated with favorable outcomes, avoiding the complications associated with post removal. Nevertheless, because this is a single case, the findings should be interpreted with caution.

Keywords: apicoectomy; apical periodontitis; retrograde filling; case report.

Received: May 06, 2025
Accepted: October 10, 2025
Online: December 30, 2025

Cite as:
Carbajal CF, Deza EL, Álvarez A, Vargas MM. Endodontic microsurgery using NeoPutty® as a retrograde filling material: a case report. Rev Estomatol Herediana. 2025; 35(4): 319-325. DOI: 10.20453/reh.v35i4.6435

* This report was based on the thesis of Claudia Fernanda Carbajal Pimentel for the completion of a second major in Endodontics.

INTRODUCTION

Apical periodontitis is a chronic inflammatory pathology of the periradicular tissues caused by bacterial colonization from necrotic root canals (1). Two types have been described: primary apical periodontitis, associated with microbial colonization of necrotic pulp tissue; and secondary apical periodontitis, related to persistent infection in previously inadequately treated root canals (2). This condition has a prevalence of 39% in teeth with prior endodontic treatment (3).

There are two alternatives for treating apical periodontitis in previously root canal-treated teeth. The first is non-surgical endodontic retreatment, which is indicated when root canal anatomy remains unaltered, adequate coronal access is available, or coronal leakage is present. It has a reported success rate of 79–85%. The second alternative is surgical endodontic retreatment, which is considered when previous treatment has failed or when non-surgical retreatment is not feasible because of complex anatomy, posts that carry a high risk of damage during removal, perforations, or resorptive defects. This approach has a success rate of 79–84% (4,5).

Endodontic microsurgery assisted by an operating microscope is a procedure that includes resection of the apical portion of the root, ultrasonic retrograde preparation of the canal, and retrograde filling with a material that provides an apical hermetic seal and promotes repair of the periapical tissues (6,7).

Bioceramic cements are inorganic, non-metallic, biocompatible materials used in direct contact with pulp and periradicular tissues, optimizing endodontic therapy (8). They are employed as retrograde filling materials due to their biocompatibility, bioactivity, antimicrobial properties, alkaline pH, and their ability to promote periapical tissue repair and the proliferation of stem cells, osteoblasts/osteoclasts, dental pulp cells, periodontal ligament cells, and immune cells (7,9).

NeoPutty® (Avalon Biomed Inc., Bradenton, USA) is a bioactive, premixed bioceramic cement recently commercialized. Its composition includes tantalum oxide, tricalcium silicate, calcium aluminate, dicalcium silicate, tricalcium aluminate, and calcium sulfate (10). A review of the literature indicates that this material sets and hardens approximately 5 hours after contact with moisture from adjacent tissues, releasing calcium and hydroxyl ions, which promote hydroxyapatite deposition and stimulate natural dentin remineralization, in addition to offering adequate handling properties that favor the repair process (11). NeoPutty® has recently been introduced for clinical use in dental procedures involving vital pulp tissue, such as direct and indirect pulp capping, pulpotomies, apexogenesis, and as a cavity base, as well as procedures in contact with periradicular tissues, including perforation sealing, resorption repair, apexification, and retrograde obturation (12-14).

Therefore, the objective of this case report is to describe the clinical findings observed during the follow-up of a previously endodontically treated tooth diagnosed with apical periodontitis in which NeoPutty® was used as a retrograde filling material, as no information has been identified regarding its application in apical microsurgery (6,15).

CASE REPORT

A 55-year-old asymptomatic male patient was referred to the Endodontics Department at the University Health Center of the Universidad Peruana de Ciencias Aplicadas for evaluation of tooth #14. The patient's general health conditions did not contribute to the requested dental treatment. The dental history reported previous endodontic treatment and the presence of a metal post. Clinical examination revealed an intraradicular metal post in good condition with adequate sealing. Radiographic examination showed a radiolucent image consistent with a periapical osteolytic lesion, as well as a radiopaque image corresponding to previous endodontic treatment and a metal post. A cone-beam computed tomography (CBCT) scan (Planmeca Romexis, Helsinki, Finland) revealed an apical lesion on the buccal root measuring 2.1 × 1.8 × 2.3 mm, with a CBCT periapical index of 3 and a buccal cortical plate thickness of less than 1 mm (Figure 1) (16). The diagnosis was previously treated tooth with asymptomatic apical periodontitis. Treatment options were discussed with the patient, who opted for apical microsurgery, providing written informed consent prior to the procedure.

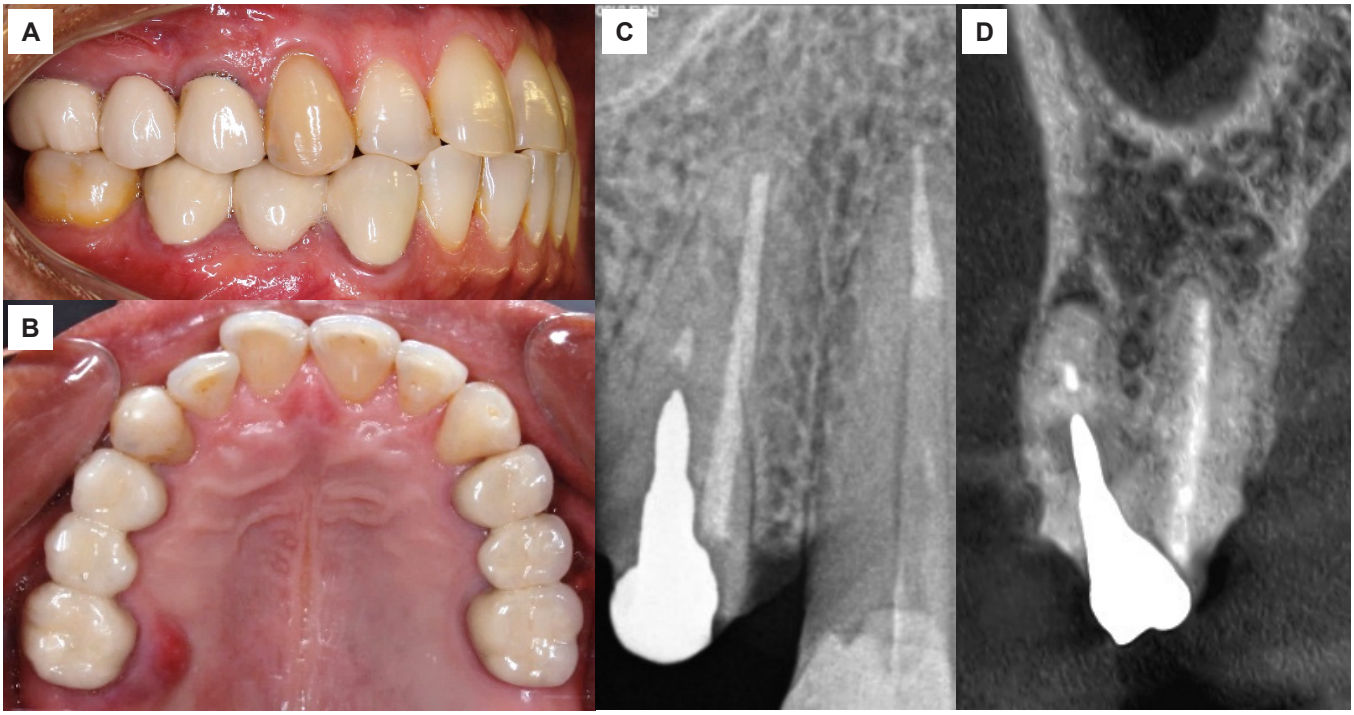

Figure 1. A) Initial occlusal photograph. (B) Initial maxillary occlusal photograph. (C) Initial mesio-angulated periapical radiograph. (D) Coronal tomographic section.

Before the microsurgical procedure, the patient's complete blood count, blood pressure, and pulse were within normal parameters. The patient performed a 0.12% chlorhexidine mouth rinse (Perio-Aid®, Dentaid, Barcelona, Spain), followed by local infiltration anesthesia with 2% lidocaine with 1:80000 epinephrine (Newcaina®, New Stetic, Colombia). During the microsurgery, a Global A-Series operating microscope (Global®, Saint Louis, MO, USA) was used. An incision was made with a No. 15 scalpel blade to create a submarginal flap, with a mesial release incision, using a P24 periosteal elevator (Osung®, Gyeonggi, Korea). Vestibular osteotomy was determined based on measurements taken on the CT scan from the cementoenamel junction to the tooth apex, which was clinically confirmed using a periodontal probe (Hu-Friedy®, Chicago, USA). The apical 3 mm of the buccal root apex was resected using a cylindrical multi-fluted bur. Methylene blue was used to ensure the absence of a root fissure, maintaining constant compression on the surgical site with gauze pads soaked in epinephrine (Medifarma, Lima, Peru). Retrograde preparation was performed using an E10D ultrasonic tip (Woodpecker®, Medical Instrument Co.). Retrograde obturation was carried out with NeoPutty®, compacted with a microspatula and a microplugger (Infiniteeth, Lima, Peru). The surgical site was irrigated with saline solution, and the flap was repositioned using 5/0 black nylon sutures (Tagumedica, Lima, Peru) (Figure 2).

The patient was monitored at 24 and 48 hours postoperatively and reported no complications following the surgical intervention. At 14 days, the patient remained asymptomatic and returned to his referring dentist to continue prosthetic treatment. At 7 months, a provisional removable partial denture was placed. Radiographic and CBCT examinations revealed signs of root repair. At 12 months, healthy soft tissues were observed, and radiographic and CBCT imaging showed bone deposition over the bioceramic material and its stability (Figure 3).

DISCUSSION

Endodontic microsurgery using NeoPutty® resulted in complete resolution of apical periodontitis. This procedure, which aims to preserve previously endodontically treated teeth, has a reported success rate of approximately 74%, with improved outcomes when an operating microscope and bioceramic cements are used (16).

The presence of an intraradicular metal post may be considered a negative prognostic factor for periapical healing due to inherent risks such as debonding or coronal leakage (17). Endodontic apical microsurgery is applicable in molars; however, it is more frequently indicated in maxillary incisors and premolars with metal posts, given the risk of excessive weakening or fracture of the tooth during post removal (16). One study reported that maxillary premolars with posts achieved a 66.7% success rate following apical surgery, with a 75.8% healing rate at 10–13 years of follow-up (18).

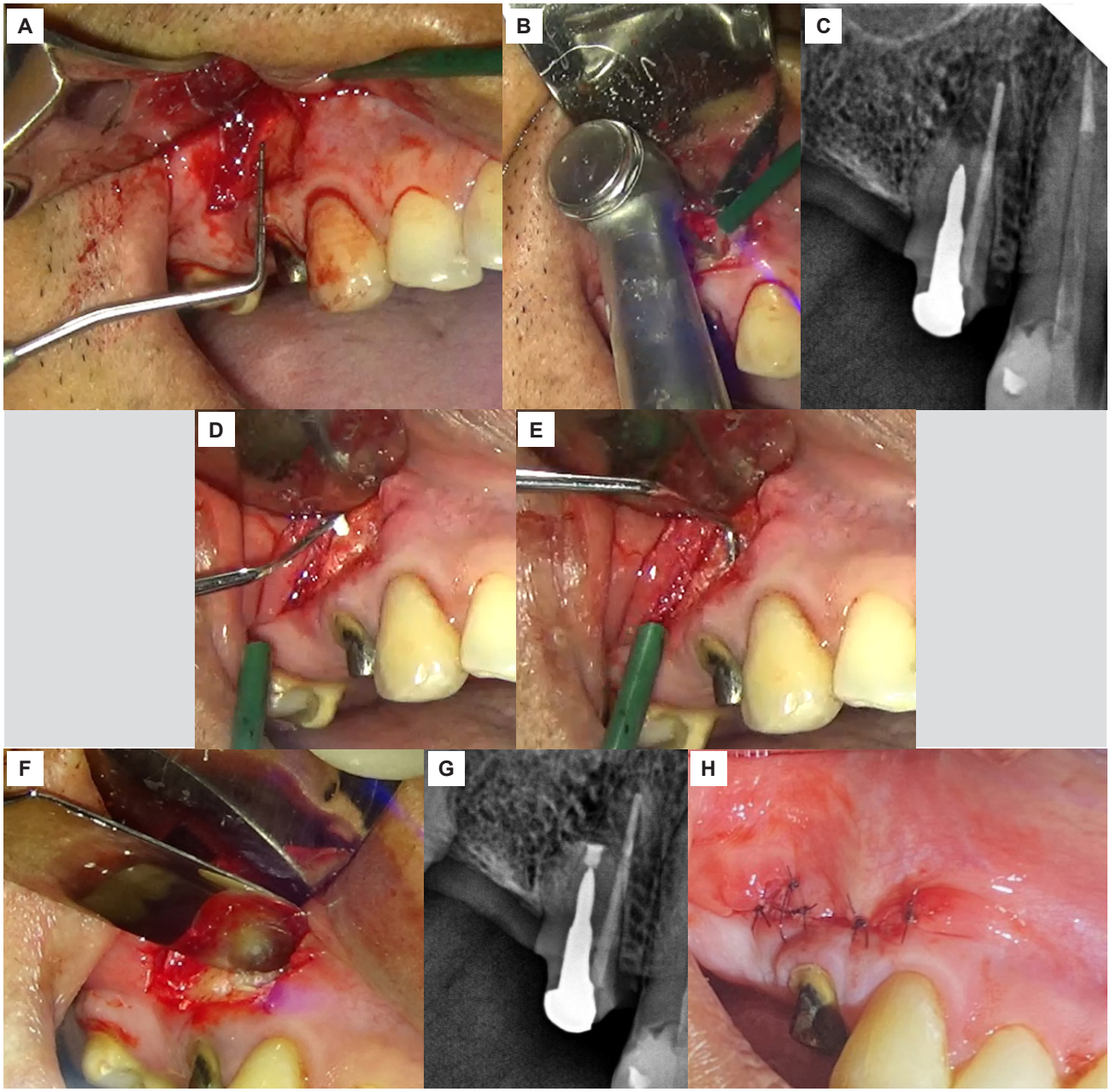

Figure 2. Microsurgical management of the case A) Clinical measurement to determine the location of the buccal root apex. B) Amputation of 3 mm of the buccal root apex using a high-speed cylindrical multi-fluted bur with irrigation. C) Periapical radiograph showing the retrograde preparation. D) Placement of the bioceramic cement NeoPutty®. E) Compaction of the bioceramic material within the canal. F) Clinical image of completed retrograde obturation. G) Periapical radiograph demonstrating adequate sealing of the bioceramic. (H) Flap repositioning and suturing.

The retrograde filling material used in this case was the bioceramic cement NeoPutty®. Although MTA® has traditionally been the most widely used cement, its sandy consistency complicates handling (6). This has driven the development of new dicalcium silicate–based materials that retain the advantageous properties of earlier bioceramics while overcoming their drawbacks. NeoPutty® is washout-resistant, exhibits a putty-like consistency, and allows for easy manipulation and placement at the surgical site; however, to date, no published data have specifically addressed its use in apical microsurgery (6,15).

A recent study comparing NeoPutty® with ProRoot MTA® and Biodentine®, two commonly used bioceramic cements, demonstrated that NeoPutty® exhibits similar or superior physical and mechanical properties, including greater compressive strength, improved setting time, and lower solubility (12). These characteristics are particularly advantageous in apical microsurgical procedures.

On the other hand, the literature reports that NeoPutty® shows comparable cell viability, migration, and adhesion to Biodentine®, highlighting its strong potential as an endodontic repair material (18,19). Another study

demonstrated that NeoPutty® exhibits greater cytocompatibility than EndoSequence BC RRM® Putty in periodontal ligament cells (15). Additionally, Tez et al. (20) reported that NeoPutty® enhances tissue regenerative capacity by inducing the expression of vascular endothelial growth factor. A systematic review further indicated that no significant differences in periapical healing were observed among the various apical sealing materials (6,17).

The present case demonstrates the success of endodontic microsurgery using NeoPutty® as a retrograde bioceramic filling material. Twelve-month clinical follow-up confirmed the absence of pain and inflammation, along with functional restoration, while radiographic and CBCT examinations showed elimination of apical periodontitis and evident bone regeneration.

The 12-month postoperative follow-up period was sufficient to demonstrate healing of the pre-existing periapical lesion. It is important to highlight that this report involves a bioceramic cement that has been minimally studied, and further published evidence is required to confirm its effectiveness.

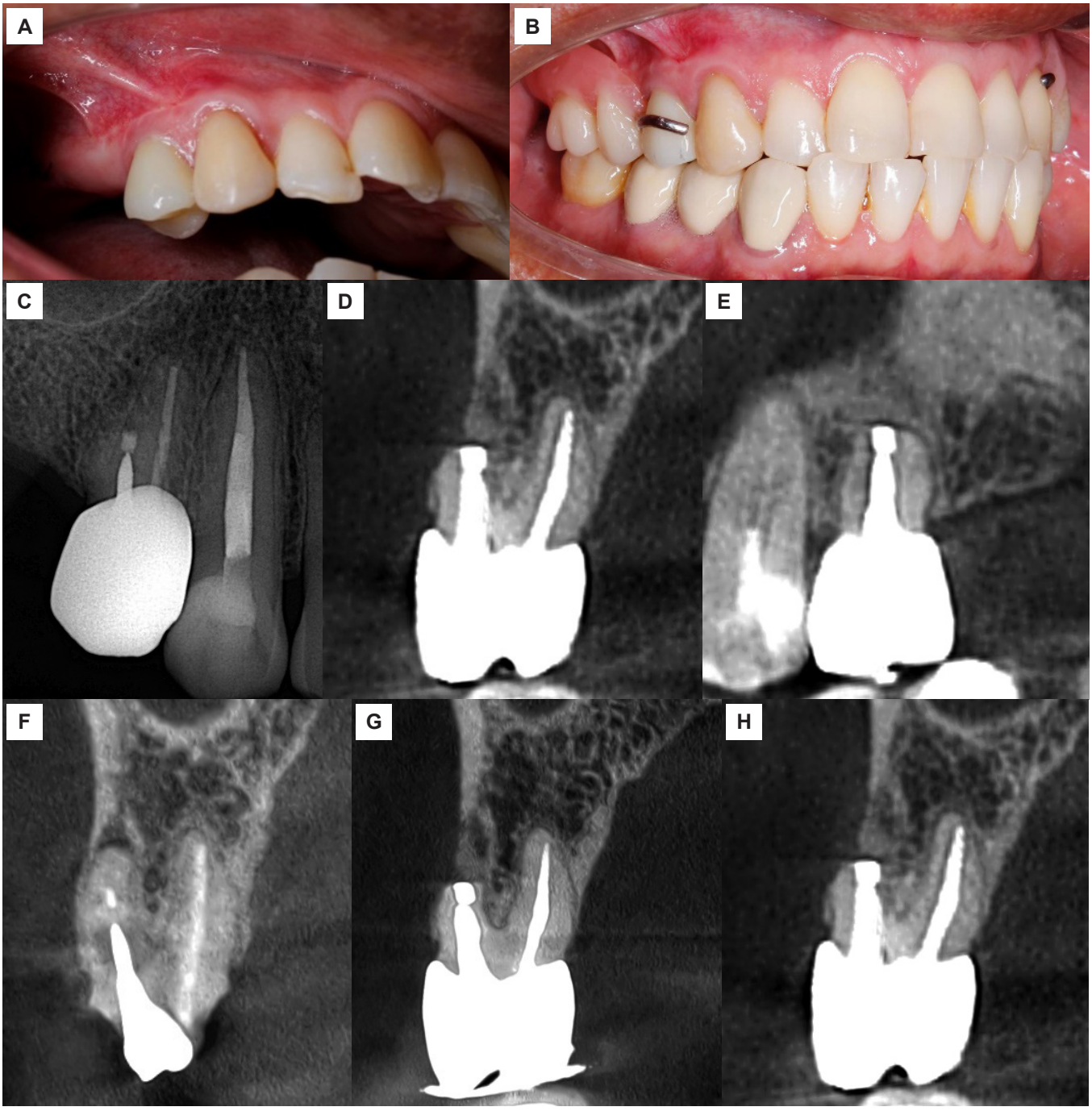

Figure 3. (A) Definitive rehabilitation with a zirconia crown. (B) Rehabilitation with a provisional removable partial denture. (C) Twelve-month follow-up periapical radiograph. D) Twelve-month follow-up CBCT scan (coronal section). (E) Twelve-month follow-up CBCT scan (sagittal section). (F) Initial CBCT coronal section. (G) Seven-month follow-up CBCT scan (coronal section). (H) Twelve-month follow-up CBCT scan (coronal section).

CONCLUSIONS

In this clinical case, endodontic microsurgery performed on a tooth restored with a post and diagnosed with apical periodontitis yielded favorable outcomes, avoiding potential complications associated with post removal. During follow-up, the use of the bioceramic cement NeoPutty® was associated with signs of repair of periapical tissue healing, which shows its usefulness in this procedure. However, as this is a single-case report, these findings should be interpreted with caution and should not be extrapolated as a general treatment recommendation.

Conflict of interest:
The authors declare no conflict of interest.

Funding:
Self-funded.

Ethics approval:
The patient provided written informed consent for publication of the case.

Authorship contribution:
CFCP: conceptualization, resources, writing of the original draft, writing – review & editing.
MMVA: conceptualization, supervision, writing – review & editing.
ELCDN: conceptualization, resources.
AAM: conceptualization, supervision.

Corresponding author:
Claudia Fernanda Carbajal Pimentel
E202310588@upc.edu.pe

REFERENCIAS

1. Bucchi C, Rosen E, Taschieri S. Non-surgical root canal treatment and retreatment versus apical surgery in treating apical periodontitis: a systematic review. Int Endod J [Internet]. 2023; 56(S3): 475-486. Available from: https://doi.org/10.1111/iej.13793
2. Bouillaguet S, Manoil D, Girard M, Louis J, Gaïa N, Leo S, et al. Root microbiota in primary and secondary apical periodontitis. Front Microbiol [Internet]. 2018; 9: 2374. Available from: https://doi.org/10.3389/fmicb.2018.02374
3. Tibúrcio-Machado CS, Michelon C, Zanatta FB, Gomes MS, Marin JA, Bier CA. The global prevalence of apical periodontitis: a systematic review and meta-analysis. Int Endod J [Internet]. 2021; 54(5): 712-735. Available from: https://doi.org/10.1111/iej.13467
4. Setzer FC, Kratchman SI. Present status and future directions: surgical endodontics. Int Endod J [Internet]. 2022; 55(S4): 1020-1058. Available from: https://doi.org/10.1111/iej.13783
5. Baseri M, Radmand F, Milani AS, Gavgani LF, Salehnia F, Dianat O. The effect of periapical lesion size on the success rate of different endodontic treatments: a systematic review and meta-analysis. Evid Based Dent [Internet]. 2023; 24(1): 43. Available from: https://doi.org/10.1038/s41432-023-00851-1
6. Pinto D, Marques A, Pereira JF, Palma PJ, Santos JM. Long-term prognosis of endodontic microsurgery - A systematic review and meta-analysis. Medicina [Internet]. 2020; 56(9): 447. Available from: https://doi.org/10.3390/medicina56090447
7. Dong X, Xu X. Bioceramics in endodontics: updates and future perspectives. Bioengineering [Internet]. 2023; 10(3): 354. Available from: https://doi.org/10.3390/bioengineering10030354
8. Montero-Miralles P, Ibáñez-Barranco R, Cabanillas-Balsera D, Areal-Quecuty V, Sánchez-Domínguez B, Martín-González J, et al. Biomaterials in periapical regeneration after microsurgical endodontics: a narrative review. J Clin Exp Dent [Internet]. 2021; 13(9): e935-e940. Available from: https://doi.org/10.4317/jced.58651
9. Janini AC, Bombarda GF, Pelepenko LE, Marciano MA. Antimicrobial activity of calcium silicate-based dental materials: a literature review. Antibiotics [Internet]. 2021; 10(7): 865. Available from: https://doi.org/10.3390/antibiotics10070865
10. Silva EC, Pradelli JA, Da Silva GF, Cerri PS, Tanomaru-Filho M, Guerreiro-Tanomaru JM. Biocompatibility and bioactive potential of NeoPUTTY calcium silicate-based cement: an in vivo study in rats. Int Endod J [Internet]. 2024; 57(6): 713-726. Available from: https://doi.org/10.1111/iej.14054

11. Acharya S, Raghunath N, Mallikarjun RM, Nalawade T, Gurunathan D, Godhi BS. Bioactive biosilicate cements in pediatric dentistry - A review of the latest materials. J Pharm Bioallied Sci [Internet]. 2024; 16(suppl 2): S1057-S1063. Available from: https://doi.org/10.4103/jpbs.jpbs_1235_23
12. Lozano-Guillén A, López-García S, Rodríguez-Lozano FJ, Sanz JL, Lozano A, Llena C, et al. Comparative cytocompatibility of the new calcium silicate-based cement NeoPutty versus NeoMTA Plus and MTA on human dental pulp cells: an in vitro study. Clin Oral Investig [Internet]. 2022; 26(12): 7219-7228. Available from: https://doi.org/10.1007/s00784-022-04682-9
13. Tawfeek HA, El-Bardissy AA, Abou El-Yazeed M, Youssef R, Abd Alsamad AM. Clinical and radiographic evaluation of NeoMTA versus conventional white mineral trioxide aggregate in revascularization of non-vital immature permanent anterior teeth (a randomized controlled trial). BDJ Open [Internet]. 2023; 9: 17. Available from: https://doi.org/10.1038/s41405-023-00143-x
14. Alqahtani AS, Alsuhaibani NN, Sulimany AM, Bawazir OA. NeoPUTTY® versus NeoMTA 2® as a pulpotomy medicament for primary molars: a randomized clinical trial. Pediatr Dent [Internet]. 2023; 45(3): 240-244. Available from: https://www.ingentaconnect.com/content/aapd/pd/2023/00000045/00000003/art00008;jsessionid=1yd8v2hoi9h4g.x-ic-live-01
15. Sun Q, Meng M, Steed JN, Sidow SJ, Bergeron BE, Niu LN, et al. Manoeuvrability and biocompatibility of endodontic tricalcium silicate-based putties. J Dent [Internet]. 2021; 104: 103530. Available from: https://doi.org/10.1016/j.jdent.2020.103530
16. Stueland H, Ørstavik D, Handal T. Treatment outcome of surgical and non-surgical endodontic retreatment of teeth with apical periodontitis. Int Endod J [Internet]. 2023; 56(6): 686-696. Available from: https://doi.org/10.1111/iej.13914
17. Ng YL, Gulabivala K. Factors that influence the outcomes of surgical endodontic treatment. Int Endod J [Internet]. 2023; 56(S2): 116-139. Available from: https://doi.org/10.1111/iej.13896
18. Truschnegg A, Rugani P, Kirnbauer B, Kqiku L, Jakse N, Kirmeier R. Long-term follow-up for apical microsurgery of teeth with core and post restorations. J Endod [Internet]. 2020; 46(2): 178-183. Available from: https://doi.org/10.1016/j.joen.2019.11.002
19. Saber SM, Gomaa SM, Elashiry MM, El-Banna A, Schäfer E. Comparative biological properties of resin-free and resin-based calcium silicate-based endodontic repair materials on human periodontal ligament stem cells. Clin Oral Investig [Internet]. 2023; 27(11): 6757-6768. Available from: https://doi.org/10.1007/s00784-023-05288-5
20. Tez BÇ, Eliaçık BB, Taşlı PN, Yılmaz H, Şahin F. Biocompatibility and cytotoxicity of pulp-capping materials on DPSCs, with marker mRNA expressions. Int Dent J [Internet]. 2024; 74(5): 1064-1077. Available from: https://doi.org/10.1016/j.identj.2024.04.006