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CASE REPORT

NON-SURGICAL ENDODONTIC TREATMENT OF CHRONIC APICAL PERIODONTITIS WITH EXTENSIVE PERIAPICAL AND FURCATION BONE DESTRUCTION: A CASE REPORT WITH 18-MONTH FOLLOW-UP

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ABSTRACT

Background: Chronic apical periodontitis associated with extensive periapical bone destruction (>10 mm) and furcation involvement represents a significant endodontic challenge and is often considered prognostically unfavorable.

Objective: To describe the non-surgical endodontic management of chronic apical periodontitis associated with an extensive periapical lesion and furcation involvement, with emphasis on long-term clinical and radiographic outcomes.

Case Presentation: A 26-year-old male patient presented with acute purulent periostitis associated with tooth 4.7. Clinical and CBCT examination revealed extensive periapical bone destruction involving the furcation region. Initial management included surgical drainage and antibiotic therapy (amoxicillin/clavulanic acid 1000 mg twice daily for 5 days). Following resolution of acute symptoms, stepwise endodontic treatment was performed using chemomechanical preparation with sodium hypochlorite and EDTA, intracanal calcium hydroxide medication for 21 days, and final obturation by vertical condensation of heated gutta-percha with AH Plus sealer. Clinical and radiographic follow-up evaluations were performed at 3, 6, 12, and 18 months.

Results: Acute inflammatory symptoms resolved completely within 5 days. Progressive radiographic bone regeneration was observed during follow-up. At 18 months, CBCT imaging demonstrated complete radiographic healing of the periapical and furcation defects with restoration of normal bone architecture. Clinically, the tooth remained asymptomatic and fully functional, with normal percussion response and physiologic mobility.

Conclusions: This case demonstrates that extensive periapical lesions with furcation involvement of primary endodontic origin may be successfully managed using a non-surgical approach. Thorough chemomechanical disinfection, intracanal calcium hydroxide medication, adequate coronal sealing, and systematic follow-up contributed to favorable long-term healing without surgical intervention.

Keywords: chronic apical periodontitis; periapical bone regeneration; furcation involvement; calcium hydroxide; vertical condensation; non-surgical endodontic treatment

INTRODUCTION

Chronic apical periodontitis (CAP) represents one of the most prevalent sequelae of pulp necrosis and bacterial infection of the root canal system, characterized by inflammatory and destructive changes in periapical tissues[1,2]. Histopathological studies have demonstrated that periapical lesions are primarily maintained by persistent intraradicular infection rather than true cystic transformation in most cases [3,4]. The extent of periapical bone destruction varies considerably; however, lesions exceeding 10 mm in diameter are generally considered extensive and are associated with a more complex healing pattern, often requiring prolonged follow-up and careful therapeutic planning[5]. When such destruction involves the furcation area of multirooted teeth, diagnostic complexity increases substantially, as accurate differentiation between primary endodontic lesions, primary

periodontal lesions, and combined endodontic-periodontal involvement is essential for appropriate treatment planning and prognosis [4,5].

Cone-beam computed tomography (CBCT) has significantly improved diagnostic accuracy in such cases by enabling three-dimensional assessment of lesion extent and furcation involvement [8]. Traditionally, teeth presenting with extensive periapical bone loss and furcation involvement have been considered to have a guarded or unfavorable prognosis, often leading to surgical intervention (apicoectomy, hemisection, root resection) or extraction [6,7,9,10]. However, contemporary endodontic literature increasingly demonstrates that nonsurgical root canal treatment, when performed with meticulous chemomechanical disinfection and appropriate intracanal medication, can achieve high rates of healing and even complete radiographic bone regeneration in cases with large periapical lesions [8–13]. Long-term clinical studies further support that adequate disinfection and obturation protocols may result in successful healing of extensive periapical radiolucencies without surgical intervention [11,12]. The biological basis of periapical healing has been extensively described, indicating that resolution of inflammation and bone regeneration occur following elimination of intracanal infection and adequate sealing of the root canal system [3,13]. Successful nonsurgical endodontic outcomes in cases of primary endodontic pathology with extensive bone loss depend on multiple interrelated factors, including accurate diagnosis, absence of prior endodontic intervention, effective chemomechanical debridement, high-quality irrigation with sodium hypochlorite and EDTA, use of intracanal medicaments—particularly calcium hydroxide due to its antimicrobial and tissue-healing properties [14]—and achievement of three-dimensional hermetic obturation with reliable coronal sealing [2,10,11,12,15]. Collectively, these factors contribute to the elimination of intracanal infection and preservation of the periapical healing potential necessary for predictable bone regeneration. The present case report describes the successful non-surgical endodontic management of a mandibular second molar (4.7) presenting with extensive periapical destruction (>10 mm) extending into the furcation region following acute purulent periostitis. The case highlights the importance of accurate diagnosis, effective infection control, and structured follow-up in achieving favorable long-term healing without surgical intervention.

CLINICAL CASE REPORT

A 26-year-old male patient presented to the clinic in May 2024 in an emergency condition, complaining of intense, radiating pain in the right mandibular region, exacerbated by occlusal contact and tooth palpation. The symptoms were accompanied by headache, general malaise, and marked sensitivity in the region of tooth 4.7. The medical history revealed intermittent dental discomfort over several years; however, following spontaneous resolution of symptoms, the patient did not seek dental care.

Objective Clinical Findings

Tooth 4.7 (mandibular right second molar) presented with a preserved natural-colored crown, compatible with adjacent teeth, and an existing occlusal restoration with apparently intact marginal adaptation. Percussion along both longitudinal and horizontal axes elicited severe pain. Palpation in the projection of the root apices and the vestibular fold was painful, and Grade I mobility of the tooth was observed. Localized swelling and mucosal erythema were present in the vestibular fold in the region of tooth 4.7. Adjacent teeth (4.6 and 4.8) responded positively to vitality testing using cold stimulation. The patient's general condition was satisfactory, with a body temperature of 37.6°C and stable vital signs.

Radiological Assessment

Periapical radiography and cone-beam computed tomography (CBCT) revealed an extensive area of bone destruction in the periapical region, exceeding 10 mm in diameter with indistinct borders. The lesion extended to the interradicular septum (furcation area), demonstrating pronounced bone rarefaction involving the apical third of all roots.

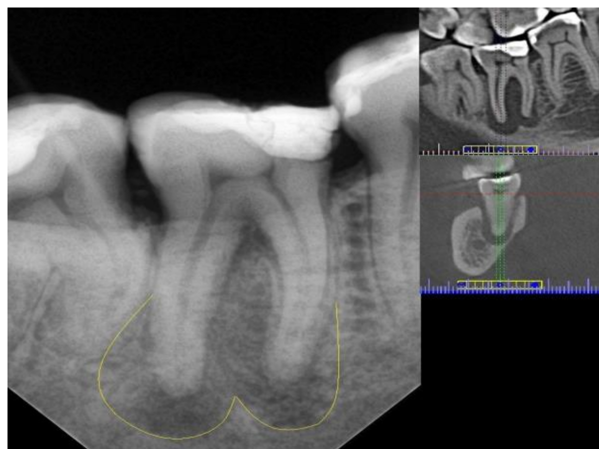

Figure 1. Preoperative CBCT and periapical radiograph demonstrating an extensive area of bone destruction in the periapical region, exceeding 10 mm in diameter with indistinct borders. The lesion extends to the interradicular septum (furcation area), showing pronounced bone rarefaction involving the apical third of all roots.

Diagnosis

Acute purulent periostitis in the active phase, secondary to chronic apical periodontitis of tooth 4.7 with extensive furcation involvement.

Treatment Protocol

Stage 1. Emergency Management

Under topical and infiltration anesthesia (articaine 4% with epinephrine 1:200,000, 1.8 mL), a linear incision was made along the vestibular fold in the region of tooth 4.7, approximately 1.5 cm in length. Purulent exudate was evacuated, and a rubber drain was placed for 48 hours. Empirical antimicrobial therapy was initiated with amoxicillin/clavulanic acid (Amoxiclav) 1000 mg twice daily for 5 days, supplemented with probiotic therapy (Bifitsin, 1 capsule daily for 8 days). Oral rinses with 0.05% chlorhexidine solution were prescribed three to four times daily. Within 5 days, acute inflammatory symptoms completely resolved, with reduction of pain and swelling, normalization of body temperature, decreased tooth mobility, and marked reduction in percussion sensitivity. No complications were observed.

Stage 2. Endodontic Treatment

Seven days after initial presentation, endodontic treatment was initiated under rubber dam isolation. Endodontic access was established through the occlusal surface following removal of the existing restoration. Working length determination was performed using both radiographic methods and an electronic apex locator. Mechanical preparation of the root canals was carried out using rotary NiTi instruments (SOCO system), with ISO sizes 30 for the mesiobuccal and mesiolingual canals and ISO size 40 for the distal canal, using a 0.06 taper protocol.

Chemical irrigation protocol included 5% sodium hypochlorite activated with an EndoActivator system, followed by 17% EDTA for 60 seconds, and a final rinse with sterile distilled water. The canals were temporarily dressed with a calcium hydroxide-based paste (Calasept) delivered via a canal carrier and sealed with a temporary restoration for 21 days.

Stage 3. Final Obturation

After 3 weeks, the canals were re-irrigated, dried with sterile paper points, and obturated using vertical condensation of thermoplasticized gutta-percha with AH Plus sealer. The coronal portion was restored with a light-cured composite resin, ensuring an adequate coronal seal.

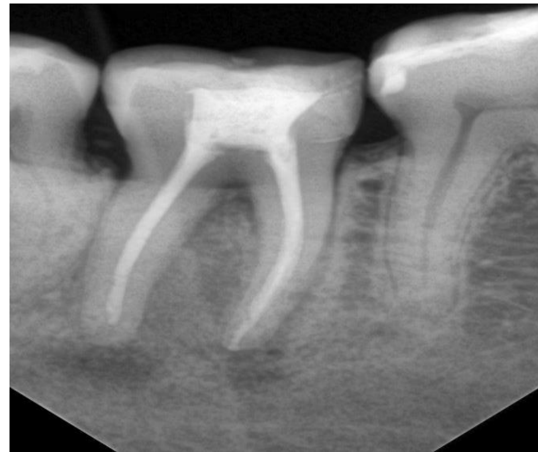

Figure2. Immediate postoperative periapical radiograph demonstrating completion of root canal obturation using vertical condensation of thermoplasticized gutta-percha with AH Plus sealer. The image shows adequate and homogeneous filling of all three canal systems, with proper apical sealing and absence of voids.

Clinical Follow-up Assessment

Clinically, the patient was followed up at 3, 6, 12, and 18 months after treatment. At all follow-up visits, the patient remained completely asymptomatic, reporting no pain or functional discomfort. Periodontal examination revealed probing depths within 2–3 mm throughout the follow-up period, with no persistent periodontal defects or furcation involvement. Tooth mobility, initially recorded as Grade I preoperatively, returned to physiological levels and remained stable throughout all subsequent evaluations. Percussion testing consistently revealed no tenderness.

Radiological Progression

Radiographically, progressive healing was observed over the follow-up period. At 6 and 12 months, partial bone regeneration was evident in both the periapical region and the furcation area, indicating ongoing reparative activity. Progressive reduction of the radiolucent area with re-establishment of trabecular bone pattern was noted during this period. Compared to the initial extensive periapical radiolucency (>10 mm), marked structural improvement was evident.

At the 18-month follow-up, CBCT imaging demonstrated complete radiographic healing of the lesion. The previously observed periapical radiolucency was fully resolved, with re-establishment of the lamina

dura along the entire root length. The interradicular septum exhibited normal trabecular density without evidence of residual rarefaction, confirming complete restoration of bone architecture in both periapical and furcation regions (Figure 3). The patient reported full functional recovery and high satisfaction with the outcome.

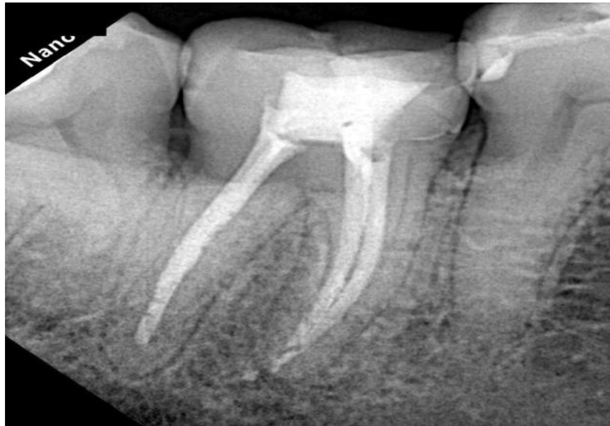

Figure 3. CBCT follow-up at 18 months post-treatment demonstrating complete restoration of periapical and furcation bone architecture. The previous radiolucent lesion has undergone complete radiographic healing. The lamina dura is clearly re-established along the entire root length, and the interradicular septum shows normal trabecular density without signs of rarefaction, indicating full recovery of bone structure in both periapical and furcation regions.

DISCUSSION

The favorable prognosis achieved in this case was substantially facilitated by the patient's young age (26 years) and the absence of previous endodontic intervention—factors consistently identified in the literature as significant positive prognostic indicators for nonsurgical root canal treatment outcomes [2,10]. Young age is associated with superior regenerative capacity of periapical tissues and enhanced vascular response, which likely contributed to the observed progression from partial healing at 6–12 months to complete radiographic resolution at 18 months.

The acute presentation with purulent periostitis, traditionally considered a prognostically unfavorable complication, was effectively managed through prompt surgical drainage and short-term antimicrobial therapy (amoxicillin/clavulanic acid 1000 mg twice daily for 5 days). Complete resolution of acute inflammatory signs within 5 days is consistent with evidence indicating that timely elimination of the infectious focus significantly improves subsequent endodontic healing outcomes [3,15]. This highlights the importance of controlling acute odontogenic infection prior to definitive endodontic intervention.

The endodontic protocol incorporated contemporary evidence-based disinfection strategies, including sodium hypochlorite activation using EndoActivator, prolonged intracanal calcium hydroxide medication for 21 days, and three-dimensional obturation using vertical condensation of thermoplasticized gutta-percha with AH Plus sealer. These measures are supported by literature demonstrating that enhanced irrigation, intracanal medicaments, and adequate obturation significantly improve healing of large periapical lesions by maximizing microbial elimination and promoting periapical repair [11,14,15].

Vitality testing of adjacent teeth (4.6 and 4.8), together with the absence of prior endodontic treatment in tooth 4.7, confirmed the primary endodontic origin of the lesion, effectively excluding a primary periodontal etiology. This distinction is critical in cases involving furcation regions, where endodontic-periodontal lesions may present similar radiographic features [4,5].

The observed healing pattern—partial radiographic regeneration at 6–12 months followed by complete resolution at 18 months—is consistent with previously reported outcomes of nonsurgical endodontic treatment in teeth with extensive periapical lesions, particularly when calcium hydroxide is used as an intracanal medicament [9,12]. CBCT-based follow-up findings in this case align with literature demonstrating the superiority of three-dimensional imaging in accurately monitoring periapical healing and furcation bone regeneration [16,17].

Complete re-establishment of lamina dura and trabecular bone architecture without the use of regenerative surgical techniques or biomaterials further supports the concept that orthograde endodontic treatment remains the primary treatment modality in cases of primary endodontic pathology with extensive bone destruction. This is in agreement with long-term clinical data demonstrating high survival and healing rates of nonsurgically treated teeth when adequate disinfection and obturation protocols are followed [8,11].

This case emphasizes the importance of individualized, evidence-based treatment planning, including timely management of acute infection, accurate diagnosis, effective chemomechanical disinfection, and strict coronal sealing. Collectively, these factors are essential for achieving predictable tooth preservation and radiographically confirmed bone regeneration even in cases with extensive furcation involvement.

LIMITATIONS

This report has inherent limitations typical of single case reports, including limited generalizability. The outcome represents a favorable clinical scenario influenced by positive prognostic factors such as young age, primary endodontic pathology, and good patient compliance. Histological confirmation of bone regeneration was not performed. Long-term stability beyond 18 months remains to be established, and variations in systemic conditions or anatomical complexity may influence outcomes in other cases.

CONCLUSION

This clinical case demonstrates successful nonsurgical endodontic treatment of a mandibular second molar (4.7) in a 26-year-old patient presenting with extensive periapical bone destruction (>10 mm) extending into the furcation region, associated with acute purulent periostitis. Complete radiographic healing of both periapical and furcation bone defects was achieved at 18 months, demonstrating the regenerative potential of periapical tissues when managed through timely infection control, effective antimicrobial strategies, meticulous chemomechanical disinfection, intracanal calcium hydroxide medication, three-dimensional obturation, and adequate coronal sealing.

The absence of complications, preservation of tooth function, and elimination of the need for surgical intervention or regenerative biomaterials support the concept that orthograde endodontic treatment remains the preferred approach in primary endodontic lesions with extensive bone destruction. These findings are consistent with contemporary evidence demonstrating favorable long-term outcomes of nonsurgical root canal therapy when strict treatment protocols are followed.

This case highlights the therapeutic potential of conservative endodontic management in young patients with preserved coronal structure, even in the presence of extensive radiographic periapical and furcation involvement.

DECLARATION

Ethics Approval and Consent to Participate

This case was conducted in accordance with the principles of the Declaration of Helsinki. The patient provided written informed consent for diagnostic procedures, treatment interventions, and publication of clinical data and radiological images in anonymized form. The investigation was approved by the appropriate institutional ethics committee.

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Competing Interests

The authors declare that they have no competing interests related to this publication.

Author Contributions

The following describes the individual contributions of each author to this manuscript:

Magomedov Ibragim Nabiyulaevich analyzed radiological findings and contributed to treatment planning.

Supiev Lugman Pastaminovich conducted the clinical examination, performed endodontic treatment, and prepared the primary draft of the manuscript.

Omarov Muslim Omarovich Critical analysis of content, clinical perspective, and manuscript review.

Gadzhiev Muradkhan Gadzhigishievich Manuscript preparation and formatting.

Merdanova Leyla Merdanovna reviewed the literature and assisted in preparation of the clinical narrative.

Ibragimova Sagdijat Arsenovna Literature review, data analysis, and contribution to manuscript writing.

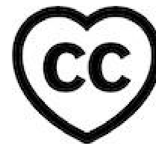
Ordashev Khasan Alievich supervised the clinical case, provided expert consultation, and edited the final manuscript.

All authors reviewed and approved the final version of the manuscript.

REFERENCES

1. American Association of Endodontists. AAE Position Statement: Treatment Standards. 2023.
2. Setzer FC, Boyer KR, Jeppson JR, Karabucak B, Kim S. Long-term prognosis of endodontically treated teeth: a retrospective analysis of preoperative factors in molars. J Endod. 2011 Jan;37(1):21-25.doi: 10.1016/j.joen.2010.10.005.
3. Ordinola-Zapata R, et al. Endodontic-Periodontic Lesions. AAE Speciality Resources. 2023.
4. Peeran SW, Ramalingam K, Sethuraman S, Thiruneervannan M. Furcation involvement in periodontal disease: a narrative review. Cureus. 2024 Mar 10;16(3):e55924. doi: 10.7759/cureus.55924.
5. Al-Sibassi A, Niazi SA, Clarke P, Adeyemi A. Management of the endodontic-periodontal lesion. Br Dent J. 2025 Apr;238(7):536-544. doi: 10.1038/s41415-025-8327-x.

6. . Huynh-Ba G, Kuonen P, Hofer D, Schmid J, Lang NP, Salvi GE. The effect of periodontal therapy on the survival rate and incidence of complications of multirooted teeth with furcation involvement after an observation period of at least 5 years: a systematic review. J Clin Periodontol. 2009 Feb;36(2):164-176. doi: 10.1111/j.1600-051X.2008.01358.x.
7. Needleman I. How long do multirooted teeth with furcation involvement survive with treatment? Evid Based Dent. 2010;11(2):38-39. doi: 10.1038/sj.ebd.6400714.
8. Sousa Melo S, Fayad M, Gohel A .AAE and AAOMR Joint Position Statement: Use of Cone-Beam Computed Tomography in Endodontics 2025 Update Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 141, 126-135
9. Peters LB, Lindeboom JA, Elst ME, Wesselink PR. Prevalence of apical periodontitis relative to endodontic treatment in an adult Dutch population: a repeated cross-sectional study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011 May;111(5):523-528. doi: 10.1016/j.tripleo.2010.10.008.
10. Kim S, et al. Prognostic factors influencing clinical outcome of nonsurgical endodontic treatment. Restor Dent Endod. 2010;35(4):436-444. doi: 10.5395/rde.2010.35.4.436.
11. Sigurdsson A, Garland RW, Le KT, Rassoulian SA. Healing of periapical lesions after endodontic treatment with the GentleWave procedure: a prospective multicenter clinical study. J Endod. 2018 Mar;44(3):510-517. doi: 10.1016/j.joen.2017.12.004.
12. Moazami F, Sahebi S, Sobhnamayan F, Alipour A. Success rate of nonsurgical endodontic treatment of nonvital teeth with variable periradicular lesions. Iran Endod J. 2011 Summer;6(3):119-124.
13. Asgary S, et al. Management of failed periodontal surgical intervention for a furcal lesion. Restor Dent Endod. 2014;39(2):115-118. doi: 10.5395/rde.2014.39.2.115.
14. Law AS, Beaumont RH. Resolution of furcation bone loss associated with vital pulp tissue after nonsurgical root canal treatment of three-rooted mandibular molars: a case report of identical twins. J Endod. 2004 Jun;30(6):444-447. doi: 10.1097/00004770-200406000-00017.
15. Chen B, Zhu Y, Lin M, et al. Expert consensus on the diagnosis and therapy of endo-periodontal lesions. Int J Oral Sci. 2024 Sep 1;16(1):55. doi: 10.1038/s41368-024-00320-0.



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