

Conservative Treatment of Periapical Lesions: A Case Series

Rinda Sharma¹, Himanshi Verma²

¹Department of Periodontics, Post Graduate Institute of Dental Sciences, PGIDS, Rohtak

²Department of Conservative Dentistry & Endodontics, Post Graduate Institute of Dental Sciences, PGIDS, Rohtak

ABSTRACT

Aim and Objective: This study aims to evaluate the nonsurgical management of periapical lesions of endodontic origin, focusing on effective healing without the need for invasive surgical intervention.

Background: Although root canal instrumentation and irrigation significantly reduce bacterial load within infected canals, achieving complete disinfection remains challenging. The application of intracanal medicaments plays a crucial role in eliminating residual microorganisms and preventing reinfection, thereby promoting periapical lesion reduction or complete resolution.

Case Description: This report presents one case involving periapical lesions. The affected teeth were accessed, cleaned, and shaped during the first appointment, followed by the placement of Metapex in the subsequent visit. After a three-month evaluation period, during which satisfactory healing was observed, obturation was performed.

Clinical Significance: Nonsurgical endodontic therapy should be considered the first-line treatment for periapical lesions, as it offers a conservative and effective approach for achieving periapical healing.

Keywords: Endodontic management, Intracanal medicament, Nonsurgical therapy, Periapical lesion, Lesion healing.

INTRODUCTION

Microorganisms play a pivotal role in the pathogenesis of endodontic infections, contributing to pulp necrosis and the subsequent spread of infection to the periapical tissues, resulting in periapical lesions.¹ The development of such lesions reflects the host's defensive response to microbial invasion from the root canal system, characterized by a dynamic interaction between microbial virulence factors and the host's immune response at the pulp-periodontal interface. This interaction often leads to localized inflammation, disorganization of periapical tissues, and resorption of hard tissue structures.^{2,3} Although periapical lesions are protective reactions against microbial challenges, they are not inherently self-healing.²

The primary objective of endodontic therapy is the complete elimination of microorganisms, their byproducts, and necrotic pulp tissue from the root canal system, thereby restoring the tooth to normal form and function without surgical intervention. Nonsurgical endodontic therapy serves as the first-line treatment for all inflammatory periapical lesions of endodontic origin.⁴ Studies have reported that approximately 94.4% of periapical lesions of endodontic origin show complete or partial resolution following conservative, nonsurgical treatment when proper infection control measures are employed.^{3,5} In cases where nonsurgical management fails, surgical intervention may then be considered.

Background

While root canal instrumentation combined with effective irrigation significantly decreases the bacterial load within infected canals, complete disinfection remains a clinical challenge. Residual microorganisms may persist in inaccessible anatomical areas such as isthmuses, apical deltas, and dentinal tubules, where they remain resistant to conventional cleaning and shaping procedures, potentially leading to persistent periapical infections. To address these residual microbes, intracanal medicaments are employed.⁶

Calcium hydroxide (CH) remains the most widely used intracanal medicament due to its well-documented antibacterial activity and versatility in combination with other agents. Among these, **Metapex**—a commercially available formulation comprising approximately 60% calcium hydroxide paste and 38% iodoform in a silicone oil base—has demonstrated excellent antimicrobial efficacy and biocompatibility.¹

This article presents a series of clinical cases reported to the **Department of Conservative Dentistry and Endodontics, PGI, Rohtak**, where periapical lesions were successfully managed nonsurgically using Metapex as an intracanal medicament.

Case Descriptions

Case 1

A 15-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with pain in the lower left posterior region and a history of a previously initiated root canal treatment. Clinical examination revealed a broken temporary restoration and gingival swelling associated with tooth **#46**. A periapical radiograph demonstrated radiolucency extending through the enamel, dentin, and pulp, along with a **3 × 3 mm** periapical radiolucency involving both roots and furcal involvement (Fig. 2A). Pulp sensibility tests elicited no response. The diagnosis was **previously initiated root canal treatment with periapical abscess** in tooth #46. A treatment plan involving incision and drainage of the abscess followed by nonsurgical endodontic therapy using Metapex was formulated.

During the first visit, an incision was made using a No. 11 BP blade, and purulent discharge was drained. A rubber drain was placed to facilitate postoperative drainage. Following this, under rubber dam isolation, access cavity preparation was completed, and biomechanical instrumentation was performed using **ProTaper rotary files**. Irrigation was carried out using **10 mL of 1.5% sodium hypochlorite (NaOCl)** per canal, followed by saline irrigation. An open dressing was provided at the end of the visit.

At the subsequent appointment, complete resolution of the gingival swelling was observed. **Metapex** was placed as an intracanal medicament and the patient was advised to return after three months. However, the patient reported after **five months**, at which point radiographic evaluation revealed complete healing of the periapical lesion. The canals were then obturated using a **single-cone obturation technique**. (Fig. 1).

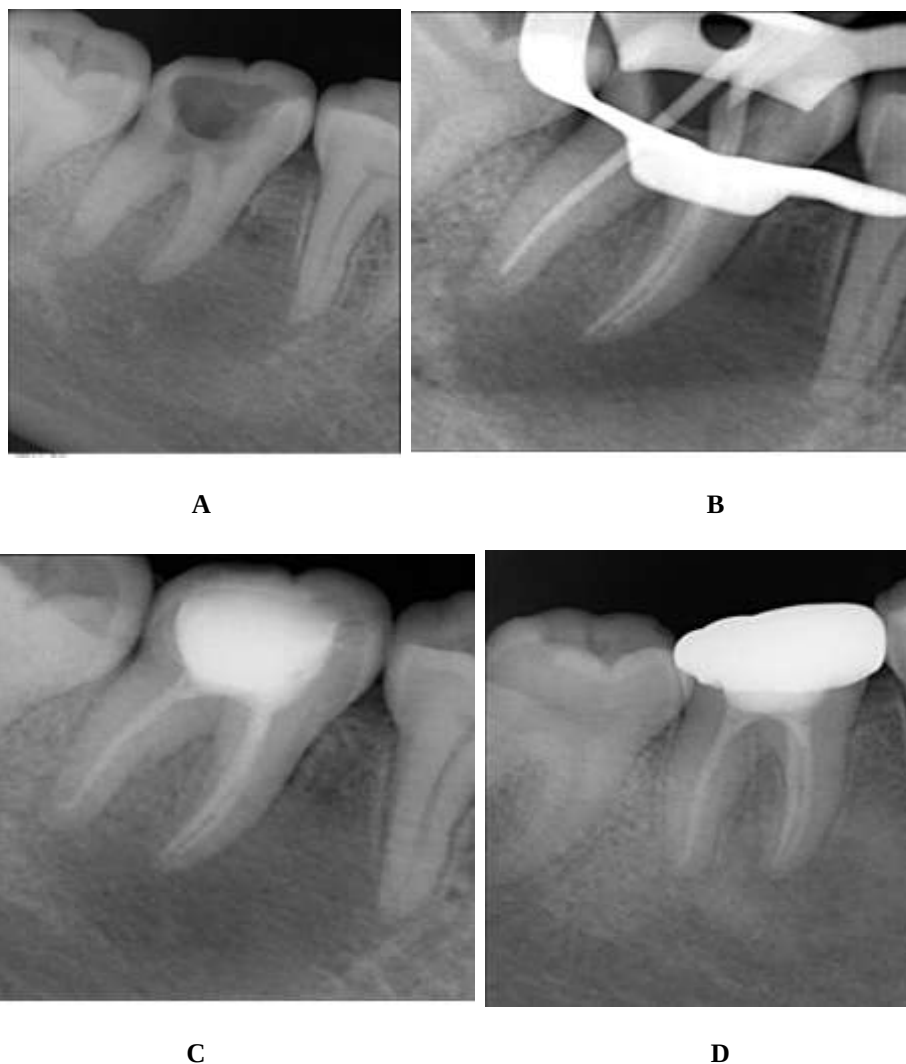


Figure 1a-Preoperative Xray , 1b-Biomechanical Preparation , 1c Obturation , 1d-1year Follow Up

DISCUSSION

Necrotic pulpal tissue serves as a reservoir for microbial colonization. The toxins released by these microorganisms diffuse into the periapical region, triggering an inflammatory response that leads to bone resorption and periapical lesion formation.³ Inflammatory lesions of endodontic origin typically range between 5 and 8 mm in diameter; lesions up to 10 mm are generally categorized as **granulomas**, whereas larger ones are considered **cysts**.

Various treatment modalities—both nonsurgical and surgical—are available for managing such lesions. Among them, thorough cleaning and shaping of the root canal system and complete microbial eradication remain the cornerstone of successful outcomes. Reports suggest that **42–74%** of periapical lesions heal following nonsurgical root canal therapy alone.²

In younger patients, surgical procedures are often considered aggressive and may compromise the crown-to-root ratio, leading to undesirable long-term outcomes. Nonsurgical endodontic treatment, on the other hand, promotes healing and continued maturation of immature permanent teeth while minimizing procedural invasiveness.⁷

Additionally, the conservative approach reduces psychological distress and improves patient compliance. Enhanced blood supply, abundant undifferentiated cells, and efficient lymphatic drainage in younger periradicular tissues contribute to faster healing once the source of infection is eliminated.²

In all cases presented, a **calcium hydroxide (Ca(OH)₂)-based paste** was used as the intracanal medicament due to its strong disinfecting potential. The goal of therapy in such cases is to remove etiological factors while allowing the periapical tissues to heal naturally.³ Radiographic evaluation after three months confirmed lesion resolution, indicated by increased bone density, trabecular reformation, and reappearance of the lamina dura. To prevent coronal leakage—an important factor that can compromise prognosis—**bonded composite restorations** were placed immediately following obturation.

Calcium hydroxide was selected as the intracanal medicament because of its well-established ability to promote periapical healing and induce apical barrier formation.⁷ It must remain within the canal for at least seven days to achieve optimal antibacterial efficacy. Its mechanism of action is largely attributed to a high pH (~12), which inhibits bacterial growth and survival by disrupting the **lipopolysaccharide-rich cell walls** of gram-negative bacteria, impairing membrane transport, and leading to cell lysis. Additionally, calcium hydroxide exerts antimicrobial activity indirectly by **absorbing CO₂**, essential for bacterial growth, and by releasing **hydroxyl ions** that diffuse into dentinal tubules.⁶ This process helps neutralize endotoxins, control inflammation, stimulate calcific tissue formation, and counteract the acidic microenvironment created by osteoclastic activity.²

However, certain species, particularly **Enterococcus faecalis**, demonstrate resistance to calcium hydroxide. This organism can persist in dentinal tubules even after retreatment and is associated with a higher failure rate when viable colonies remain at the time of obturation. To enhance antimicrobial efficacy, calcium hydroxide has been combined with synergistic agents possessing complementary chemical properties.⁶

Studies comparing calcium hydroxide alone with its combinations indicate that, at deeper dentinal levels (up to 250 µm), calcium hydroxide alone may exhibit reduced diffusion and antimicrobial activity, allowing residual *E. faecalis* to survive. The **buffering capacity of dentin** may also attenuate the high pH of calcium hydroxide at deeper levels, permitting bacterial persistence. *E. faecalis* is typically eliminated only at pH values above 11.5.

Metapex, composed of approximately 60% calcium hydroxide and 38% iodoform in a silicone oil base, has demonstrated superior antimicrobial action, particularly at greater dentinal depths. Its enhanced efficacy can be attributed to the **iodoform component** and the **oily vehicle**, which sustain the release and availability of the active ingredients for extended durations.⁶ This prolonged antimicrobial effect facilitates deeper bacterial eradication, including resistant strains such as *E. faecalis*. Furthermore, iodoform exhibits biocompatibility with host tissues, making Metapex a preferred resorbable medicament, even in **primary pulpectomy procedures**.

Collectively, the presented cases underscore the effectiveness of calcium hydroxide–iodoform formulations in achieving periapical healing through conservative, nonsurgical endodontic management.

CONCLUSION

All four reported cases demonstrated successful healing of extensive periradicular lesions through the use of **Metapex as an intracanal medicament** in conjunction with standard nonsurgical endodontic treatment. These findings reinforce that inflammatory periapical lesions of endodontic origin can be effectively managed and resolved **without surgical intervention**, provided that adequate disinfection and microbial control are achieved.

Clinical Significance

Nonsurgical endodontic therapy should be regarded as the **first-line treatment** for periapical lesions, offering a conservative, effective, and biologically favorable approach that minimizes surgical trauma while promoting natural periapical healing.

REFERENCES

- [1]. Dubey S, Dhole T, Boruah L, et al. Comparative antimicrobial efficacy of Metapex, Metronidazole, BioPure MTAD, Aztreonam on *Bacteroides fragilis* and *Propionibacterium acne*. J Conserv Dent 2013;16(4):327. DOI: 10.4103/0972-0707.114361.
- [2]. Ghorbanzadeh S, Ashraf H, Hosseinpour S, et al. Nonsurgical management of a large periapical lesion: a case report. Iran Endod J 2017;12(2):253–256. DOI: 10.22037/iej.2017.49.
- [3]. Sood N, Maheshwari N, Gothi R, et al. Treatment of large periapical cyst like lesion: a noninvasive approach: a report of two cases. Int J Clin Pediatr Dent 2015;8(2):133–137. DOI: 10.5005/jp-journals-10005-1299.
- [4]. Fernandes M, De Ataíde I. Non-surgical management of a large periapical lesion using a simple aspiration technique: a case report. Int Endod J 2010;43(6):536–542. DOI: 10.1111/j.1365-2591.2010.01719.x.
- [5]. Fernandes M, Ataíde I. Nonsurgical management of periapical lesions. J Conserv Dent 2010;13(4):240. DOI: 10.4103/0972-0707.73384.
- [6]. Cwikla S, Belanger M, Giguere S, et al. Dentinal tubule disinfection using three calcium hydroxide formulations. J Endod 2005;31(1):50–52. DOI: 10.1097/01.don.0000134291.03828.d1.
- [7]. Ogonji G. Non-surgical management of a chronic periapical lesion associated with traumatised maxillary central incisors: case report. East Afr Med J 2004;81(2):108–110. DOI:10.4314/eamj.v81i2.9135.