

Treating Apical Periodontitis With a Nonsurgical Approach

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Abstract: This article presents a clinical case involving a necrotic molar with apical periodontitis (AP) that was successfully treated with appropriate root canal therapy. As supported by dental literature and clinical experience, in most cases of AP a favorable outcome can be achieved when the root canal system is properly cleaned, shaped, and obturated, followed by placement of a well-sealed restoration. The high success rate is directly related to the quality of the clinical procedure. Therefore, clinicians must implement evidence-based strategies, utilize effective techniques, and select high-quality materials to consistently deliver optimal results for patients.

Apical periodontitis (AP) is an acute or chronic inflammatory lesion located around the apex of a tooth root, most commonly caused by bacterial invasion of the dental pulp. It is a frequent consequence of untreated dental caries and can be considered part of the natural progression from tooth decay, to irreversible pulpitis, to pulpal necrosis.¹ A favorable outcome can be attained in most cases of AP—exceeding 90% to 95%—when the root canal system is properly cleaned, shaped, and obturated, and a well-sealed restoration is placed.² AP is a common condition, with its prevalence varying by age group: 33% in individuals aged 20 to 30 years, 40% in those aged 30 to 40 years, 48% in 40- to 50-year-olds, 57% in 50- to 60-year-olds, and 62% in patients over 60 years. Most epidemiological studies on AP have been conducted in European countries, particularly those in Scandinavia.³

The term “apical periodontitis” refers to inflammation of the periodontium—the tissue surrounding the teeth—at the apex (tip) of the tooth’s root.⁴ AP can manifest in two forms.⁵ Asymptomatic apical periodontitis does not present clinical signs or symptoms. However, prolonged inflammation can lead to destruction of the surrounding tissue. Previously referred to as “chronic apical periodontitis,” it typically develops gradually and persists. The other form, symptomatic apical periodontitis, is characterized by pain and discomfort during biting or contact with surrounding teeth. It often arises suddenly, progresses quickly, and is usually acute but may also become chronic over time.

The following case report describes a common clinical

case involving a necrotic molar with AP that was successfully treated with appropriate root canal therapy. Figure 1 depicts the proposed operative sequence using Edge X7



A favorable outcome can be attained in most cases of apical periodontitis when the root canal system is properly cleaned, shaped, and obturated, and a well-sealed restoration is placed.

Utopia™ endodontic files (EdgeEndo, Edgeendo.com); an additional photograph of Edge X7 Utopia .04 tapered files is shown in Figure 2.

Clinical Case

A 44-year-old female patient presented with pain during chewing on the mandibular right first molar. She also reported occasional swelling and spontaneous pain. The tooth had been restored with a full crown approximately 10 years prior, and the patient recalled episodes of mild hypersensitivity that had recently subsided. Over the previous 2 weeks, however, she experienced

chewing discomfort and intermittent pain, prompting her visit for evaluation.

An intraoral examination revealed tenderness on percussion, and the tooth did not respond to cold testing.

A periapical radiograph showed a periapical lesion (Figure 3), likely associated with pulpal necrosis. No deep probing was recorded, and no fistula was present. The absence of a singular deep probing and absence of typical radiographic signs of fracture (eg, J-shape) suggested root canal therapy as the optimal treatment choice. A diagnosis of AP was made, and root canal treatment was recommended following crown removal.

The case, however, presented several challenges, particularly the presence of a pre-existing crown and the history of hypersensitivity, suggesting the possibility of pulpal calcifications. These calcifications can narrow the canals, complicating their negotiation.



Asymptomatic AP does not present clinical signs or symptoms. However, prolonged inflammation can lead to destruction of the surrounding tissue.

A precise access cavity was recommended to locate canal orifices and minimize coronal interference during instrumentation. Crown removal was advised before initiating treatment.⁶

The root canals were identified as narrow,⁷ requiring the use of nickel-titanium (NiTi) rotary instruments. The instruments chosen (Edge X7 Utopia) were selected for their flexibility, torsional resistance, and cutting efficiency.^{8,9} Designed with unique heat treatment, these instruments offer an optimal combination of mechanical properties.

The treatment plan included the use of X7 instruments with a constant .04 taper (Figure 1): size 17 – glide path file; size 25 – initial shaping file; size 30 – final shaping file. The instruments' parabolic design and reduced cutting blade length are designed to preserve cervical dentin, lowering the risk of structural weakening in crowned teeth.¹⁰

Procedure

After removal of the crown, a conservative access cavity was prepared with a diamond bur to minimize further loss of tooth structure.¹¹ Despite partial calcification of the pulp chamber, all three canal orifices were located and negotiated with a #10 ISO K-file.¹² Working lengths were established (Figure 4).

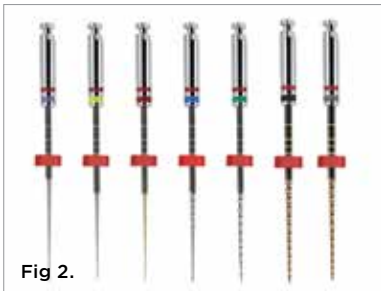


Fig 1. The proposed operative sequence with the endodontic files selected. **Fig 2.** X7 instruments with a constant .04 taper. **Fig 3.** Preoperative radiograph, tooth No. 30. **Fig 4.** Intraoperative radiograph. **Fig 5.** Immediate postoperative radiograph. **Fig 6.** Follow-up at 6 months, prior to final restorative crown. **Fig 7.** Final follow-up.

Instrumentation challenges included narrow canals, hard dentin, and a high risk of torsional stress. The Edge X7 Utopia instruments offered superior resistance to torsional loading compared to the EdgeFile X7 legacy files. Instrumentation was performed using a 2.4 Ncm torque at 400 rpm, with careful pecking motions (1 mm to 2 mm) and stepwise progression to avoid overloading the instruments.¹³ (The manufacturer's directions for use call for 4.0 Ncm at 500 rpm. Speed and torque adjustments were made to accommodate the case presentation.) Sodium hypochlorite (5%) was used throughout for irrigation.¹⁴

After shaping to size 30/.04, the canals were irrigated with a combination of sodium hypochlorite, 17% EDTA, and ultrasonic activation.¹⁴ They were then obturated in a single visit using a hydraulic condensation technique with bioceramic sealer (EdgeBioCeramic™ Sealer, EdgeEndo) and EdgeFile X7.04 gutta percha points (available in the United States soon as of the time of this writing).¹⁵ This technique, facilitated by the sealer, is minimally invasive, requiring minimal canal enlargement while ensuring a 3-dimensional fill.^{16,17}

Despite slight sealer extrusion, the patient experienced no significant postoperative discomfort (Figure 5).¹⁸ A temporary crown was placed for 6 months to allow initial healing (Figure 6), followed by a permanent crown.

At the final follow-up (Figure 7), radiographs confirmed complete lesion healing and the bioceramic sealer's biocompatibility, with the extruded material resorbed. The patient remained asymptomatic throughout this time, underscoring the effectiveness of meticulous root canal therapy in managing apical periodontitis.¹⁹

Conclusion

Nonsurgical endodontic treatment remains the most conservative and effective approach for managing apical periodontitis. However, treatment success depends on the clinician's skill, appropriate case assessment, and the selection of optimal techniques and materials. In challenging cases, such as those involving calcified or narrow canals, clinicians should adopt advanced strategies and tools to ensure high success rates and long-term patient outcomes.²⁰

DISCLOSURE

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