

Successful Nonsurgical Management of a Periapical Cyst Following Orthograde Endodontic Treatment: A Case Report

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Abstract: Periapical inflammatory lesions associated with necrotic teeth are common consequences of microbial infection of the root canal system. Among these lesions, radicular cysts may present as well-defined, unilocular periapical radiolucencies, particularly in the anterior maxilla. Although large or cyst-like lesions have traditionally been considered for periapical surgery, contemporary endodontic treatment emphasizes elimination of the intraradicular microbial challenge through adequate chemomechanical preparation, irrigation, intracanal medication when indicated, and three-dimensional obturation. This case report describes the successful nonsurgical management of a large periapical cyst-like lesion associated with a non-vital maxillary anterior tooth. Following clinical examination, pulp sensibility testing, periodontal assessment, and radiographic evaluation, the affected teeth were diagnosed as non-vital with associated apical periodontitis and a cyst-like periapical lesion. Conventional root canal treatment was performed under rubber dam isolation with meticulous access preparation, working-length determination, biomechanical preparation, copious antimicrobial irrigation, intracanal medication, and three-dimensional obturation. A sequential irrigation protocol using 5.25% sodium hypochlorite, 17% EDTA, saline, and 2% chlorhexidine was performed with passive ultrasonic activation. Triple antibiotic paste was placed twice for 15-day intervals. The canal was subsequently obturated using a 50/2% gutta-percha master cone followed by lateral condensation with accessory cones. At follow-up, clinical symptoms resolved and serial radiographs demonstrated progressive reduction of the periapical radiolucency with evidence of periapical bone regeneration. At one year, the tooth remained asymptomatic and functional, and no periapical surgery was required. The case supports nonsurgical endodontic treatment as a conservative initial approach for selected cyst-like periapical lesions, while recognizing that persistent disease may require surgical intervention.

Keywords: Periapical Cyst; Radicular Cyst; Cyst-Like Periapical Lesion; Nonsurgical Endodontic Treatment; Root Canal Treatment; Chemomechanical Preparation; Periapical Healing; Apical Periodontitis; Conservative Endodontics.

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I. INTRODUCTION

Periapical cysts are inflammatory odontogenic lesions commonly associated with pulpal necrosis and apical periodontitis. Their management has traditionally included surgical intervention when lesions are large, persistent, or suspected to represent true cysts. However, elimination of intracanal infection through meticulous nonsurgical root canal treatment can promote resolution of many cyst-like periapical lesions and may avoid periapical surgery in appropriately selected cases.¹⁻³ The rationale for nonsurgical management is based on effective chemomechanical

debridement, adequate irrigation, intracanal medication when indicated, and three-dimensional obturation followed by an effective coronal seal. Reduction of the intracanal microbial load and disruption of biofilm architecture are central to resolution of periapical inflammation.^{4,5} Recent clinical evidence has also demonstrated favourable radiographic healing of large cyst-like lesions following nonsurgical endodontic treatment.^{6,7} This case describes the successful nonsurgical management of a periapical cyst associated with a maxillary anterior tooth using meticulous root canal treatment without periapical surgery.

II. CASE REPORT

A 38-year-old male patient reported with intermittent pain and discomfort in the maxillary anterior region. Clinical examination revealed non-vital maxillary anterior teeth 11, 21 and 22 associated with tenderness on percussion. Radiographic examination demonstrated a well-defined, unilocular periapical radiolucency associated with the affected region, suggestive of a periapical cyst. No root fracture or significant periodontal involvement was evident. Following local anaesthesia and rubber dam isolation, conventional nonsurgical root canal treatment was initiated. Access preparation was performed, and working length was established using an electronic apex locator (Root ZX Mini, J. Morita, Japan) and confirmed radiographically. Biomechanical preparation was performed with Mani hand K-files up to size #70 with a 2% taper using the step-back technique. During preparation, 5.25% sodium hypochlorite (NaOCl) was used as the primary irrigant and was replenished copiously. Final irrigation was performed sequentially with fresh 5.25% NaOCl, 17% EDTA for smear-layer removal, sterile normal saline, and 2% chlorhexidine (CHX) as the final antimicrobial irrigant. An intermediate saline rinse was used between NaOCl and CHX to avoid direct interaction. Passive ultrasonic irrigation was then performed with a non-cutting ultrasonic tip positioned approximately 1–2 mm short of the working length without binding against the canal walls. Each irrigant was freshly replenished before activation. NaOCl was activated for three cycles of 20 seconds, followed by EDTA for three cycles of 20 seconds, saline rinsing, and CHX activation for three cycles of 20 seconds. Gentle vertical movement of the tip was used during each activation cycle to facilitate irrigant exchange. After irrigation, the canal was dried with sterile paper points. Triple antibiotic paste (TAP) was placed as an intracanal medicament and the access was sealed temporarily. The patient was recalled after 15 days and was asymptomatic. The TAP was removed with copious sterile saline irrigation and passive ultrasonic activation, followed by a second TAP application for another 15-day interval. At the second recall, the patient remained asymptomatic. The second TAP dressing was completely removed using copious irrigation and passive ultrasonic activation, and the canal was dried. The canal was obturated using a 50/2% gutta-percha master cone followed by lateral condensation with accessory gutta-percha cones to obtain a well-compacted three-dimensional root filling. Definitive coronal restoration was subsequently provided. Periodic clinical and radiographic follow-up demonstrated resolution of symptoms and progressive reduction of the periapical radiolucency with evidence of periapical bone regeneration. At one year, the tooth remained asymptomatic and functional, with no tenderness to percussion or palpation. Radiographic examination showed substantial reduction/resolution of the periapical lesion, supporting successful nonsurgical healing. Post 18 months Follow-up, internal bleaching was performed to improve the intrinsic discoloration of the non-vital anterior tooth. Under rubber dam isolation, a cervical barrier was placed over the gutta-percha, and opalescence endo within the pulp chamber over which interim restoration was placed. The bleaching material was replaced at 5 days interval for 2 times. After colour stabilization, the patient desired further

improvement in tooth morphology, shade harmony, and overall esthetics. After discussing the available restorative options, an IPS e.max lithium-disilicate crown was selected and adhesively cemented. The patient expressed satisfaction with the final esthetic outcome.

III. DISCUSSIONS

Nonsurgical endodontic treatment is a conservative, biologically based approach for managing radicular cysts associated with infected or necrotic teeth. The principal objective is elimination of the intraradicular microbial infection through effective chemomechanical preparation, irrigation, intracanal medication when indicated, and three-dimensional obturation. By removing the principal etiological stimulus for periapical inflammation, the periapical tissues may undergo repair without immediate surgery.¹ Successful nonsurgical management depends largely on effective microbial control within the root canal system. Adequate instrumentation, copious irrigation, and appropriate intracanal medication facilitate microbial reduction and resolution of the inflammatory response.^{2–5} In the present case, meticulous preparation was complemented by a sequential irrigation protocol and passive ultrasonic activation. The use of fresh irrigant between activation cycles was intended to promote irrigant exchange and enhance canal debridement. Two 15-day applications of TAP were used as intracanal medication before obturation. The canal was then three-dimensionally filled and subsequently restored to limit microbial re-entry. The favourable clinical and radiographic response supports the principle that elimination of the intracanal infection can permit healing of selected cyst-like lesions. Long-term clinical evidence has reported healing of large cyst-like periapical lesions following nonsurgical root canal treatment; one cited study of 42 mature anterior teeth with lesions measuring 7–18 mm reported complete healing in 73.8% and incomplete healing in a further 9.5% of cases.⁶ Nevertheless, not every cystic lesion is expected to resolve nonsurgically. Persistent extraradicular infection, true cystic pathology, foreign-body reactions, inaccessible anatomy, procedural complications, or failure of lesion regression may necessitate surgical treatment. Therefore, lesion size or radiographic appearance alone should not be considered an absolute indication for periapical surgery. Treatment decisions should consider restorability, quality of disinfection, anatomical factors, clinical findings, lesion characteristics, and the response to treatment. The one-year outcome in the present case demonstrates that carefully performed nonsurgical endodontic therapy can provide favourable healing while preserving the natural tooth and avoiding surgical intervention in a selected case.

IV. CONCLUSION

The present case demonstrates favourable clinical and radiographic healing following nonsurgical endodontic treatment of a periapical cyst-like lesion. Thorough chemomechanical preparation, effective irrigation, intracanal disinfection, three-dimensional obturation, and an adequate coronal seal address the primary intraradicular source of infection and create conditions conducive to periapical repair.

Thus, nonsurgical root canal treatment may be considered a minimally invasive first-line approach for appropriately selected radicular cystic lesions, with surgery reserved for cases demonstrating persistent disease or failure to heal after adequate treatment and observation. Long-term clinical and radiographic follow-up remains essential because periapical repair is a gradual biological process.

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