

Surgical Management of a Chronic Periapical Lesion in a Permanent Maxillary Central Incisor Following Dental Trauma: A Case Report

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ABSTRACT

A 20-year-old male presented with persistent pus drainage from the maxillary right central incisor and a history of trauma sustained ten years earlier. Clinical examination revealed a discolored, non-vital tooth with a labial sinus tract and a large periapical radiolucency on intraoral periapical radiograph (IOPA). Staged nonsurgical root canal therapy (RCT) was performed using rotary instrumentation and multiple calcium hydroxide dressings until the canal was clinically dry and the sinus tract resolved. Despite satisfactory obturation, persistent radiographic pathology and intermittent drainage prompted periapical surgery. A labial full-thickness mucoperiosteal flap was reflected, periapical curettage performed, and an ultrasonic retrograde cavity prepared and filled with mineral trioxide aggregate (MTA). The patient received systemic antibiotics and analgesics for five days postoperatively. Sequential IOPA images were obtained at pre-RCT, post-RCT/preoperative, immediate postoperative, 1.5-month, and 3-month follow-ups. Sutures were removed seven days after surgery. Clinical resolution of drainage and progressive radiographic bone fill were observed at follow-up visits, indicating successful management of a chronic traumatic periapical lesion by combining nonsurgical and surgical endodontic approaches. This report discusses the rationale, technique, and short-term outcomes with reference to contemporary literature.

Keywords: chronic periapical lesion; mineral trioxide aggregate; calcium hydroxide; retrograde filling; endodontic surgery; dental trauma

1. INTRODUCTION:

Traumatic injuries to anterior teeth frequently result in pulp necrosis and chronic periapical pathology that may persist for years if not adequately managed ^[1]. The primary objective of endodontic therapy is the elimination of intraradicular infection and the establishment of conditions favorable for periapical healing; however, long-standing lesions with sinus tracts or large periapical radiolucency may not resolve with single-stage nonsurgical therapy alone ^[2,3]. Calcium hydroxide remains a widely used intracanal medicament because of its antimicrobial properties and ability to create an alkaline environment that promotes hard tissue formation and reduces bacterial load in persistent infections ^[4,5]. When nonsurgical measures fail to produce radiographic and clinical resolution, surgical endodontic intervention is indicated to remove persistent periapical pathology and provide a hermetic apical seal ^[6]. Mineral trioxide aggregate (MTA) is supported by contemporary evidence as a preferred retrograde filling material because of its biocompatibility, sealing ability, and capacity to promote cementogenesis and bone healing ^[7,8]. Recent systematic reviews and CBCT-based studies report favorable outcomes for periapical surgery using MTA retrograde fillings and emphasize the importance of case selection and meticulous surgical technique ^[9,10]. This case report documents a staged nonsurgical and surgical approach to a chronic periapical lesion in a permanent maxillary central incisor following dental trauma in 10 years of age, with sequential radiographic documentation and short-term follow-up.

2. AIM

To present a detailed clinical report of staged nonsurgical root canal therapy followed by periapical surgery with mineral trioxide aggregate (MTA) retrograde filling for the management of a chronic periapical lesion in a traumatized permanent maxillary central incisor and to discuss the rationale and short-term outcomes in the context of recent literature.

3. CASE HISTORY

A 20-year-old male presented to the endodontic clinic with a chief complaint of intermittent pus drainage from the upper front tooth region for 5 months. The patient reported a history of a fall at the age of 10 years, which involved the same tooth. The medical history was non-contributory. Extraoral examination was unremarkable. Intraoral examination revealed discoloration of the maxillary right central incisor (tooth #11) and a draining sinus tract on the labial mucosa adjacent to the tooth. The tooth was non-responsive to cold and electric pulp testing. Periodontal probing depths were within normal limits,

and there was no mobility. A baseline intraoral periapical radiograph (pre-RCT IOPA) showed a well-circumscribed radiolucency of approximately 6–8 mm in diameter centered at the apical region of tooth #11, consistent with a chronic periapical lesion (Figure 1). The tooth was judged restorable, and the patient provided written informed consent for staged endodontic treatment with possible surgical intervention and for anonymized publication of clinical data and radiographs.

4. DIAGNOSIS

Chronic apical periodontitis secondary to pulp necrosis of tooth #11 with an associated draining sinus tract.

5. TREATMENT

5.1 Nonsurgical phase (Root canal therapy)

Treatment was performed under rubber dam isolation. Local anesthesia (2% lignocaine with 1:80,000 epinephrine) was administered. A conservative access cavity was prepared, and the working length was determined using an electronic apex locator and confirmed radiographically. Cleaning and shaping were performed using a crown-down rotary NiTi protocol (size and system per operator preference) with copious irrigation of 3% sodium hypochlorite and intermittent saline rinses. Because of the chronicity of the infection and the presence of a sinus tract, calcium hydroxide paste was placed as an intracanal medicament, and the access cavity was temporized with a provisional restoration. The patient returned weekly for clinical review; calcium hydroxide was refreshed at each visit until the sinus tract resolved and the canal was clinically dry (total of three dressing changes over approximately 2–3 weeks). After clinical signs of infection subsided, the canal was obturated using gutta-percha and an epoxy resin sealer with a warm vertical compaction technique. A post-obturation IOPA confirmed adequate obturation (Figure 2). The patient was reviewed and counselled regarding the possibility of surgical intervention if radiographic healing did not progress.

5.2 Indication for surgery and surgical procedure

At the 4- to 6-week review, despite satisfactory obturation, the periapical radiolucency persisted with intermittent minor drainage reported by the patient. Given the chronicity, size of the lesion, and persistent radiographic pathology, periapical surgery was planned to remove the persistent periapical pathology and place a retrograde seal. Preoperative planning included periapical radiographs and clinical assessment of soft tissue and bone contours.

Under local anesthesia, a labial full-thickness mucoperiosteal flap was reflected to expose the lesion. Periapical curettage was performed, and granulation tissue was removed; the tissue was histopathologically examined. The root apex was inspected, and a 3 mm apicoectomy was performed with a fissure bur to remove the apical delta and any infected apical ramifications. A retrograde cavity was prepared using ultrasonic retro tips to a depth of approximately 3 mm. Mineral trioxide aggregate (MTA) was mixed according to the manufacturer's instructions, placed into the retrograde cavity, compacted gently, and allowed to set. The surgical site was irrigated, the flap was repositioned, and sutured with interrupted 4-0 silk sutures. An immediate postoperative IOPA was taken to document the retrograde filling (Figure 3). The patient was prescribed systemic antibiotics (amoxicillin 500 mg three times daily for five days) and analgesics (ibuprofen 400 mg three times daily as needed for five days) and was given standard postoperative instructions. Sutures were removed seven days after surgery.

OUTCOME AND FOLLOW-UP

Sequential IOPA radiographs were obtained at the following time points: pre-RCT (baseline, Figure 1), post-RCT/preoperative (Figure 2), immediate postoperative (after retrograde MTA placement, Figure 3), 1.5-month follow-up (Figure 4), and 3-month follow-up (Figure 5). Clinically, the sinus tract resolved after the nonsurgical phase and did not recur following surgery. At the 1.5-month radiograph, early signs of bone fill and reduction in radiolucency were evident. At the 3-month follow-up, progressive reduction in radiolucency and increased radiopacity consistent with bone regeneration were observed. The patient reported no pain and expressed satisfaction with the esthetic and functional outcomes. Histopathologic examination of the curetted tissue revealed chronic inflammatory granulation tissue consistent with a chronic periapical lesion. No intraoperative or postoperative complications were recorded during the follow-up period.

DISCUSSION

This case demonstrates a staged approach to a chronic periapical lesion secondary to remote trauma. The initial nonsurgical phase emphasized thorough disinfection and the use of calcium hydroxide as an intracanal medicament. Contemporary reviews support calcium hydroxide's role in reducing bacterial counts and promoting a favorable environment for healing in persistent endodontic infections^[4,11]. Multiple dressing changes were used until clinical signs (sinus tract and exudation) resolved, consistent with established protocols for managing chronic infections^[1,5].

Despite adequate obturation, persistent radiographic pathology and intermittent drainage indicated residual periapical disease likely maintained by extraradicular infection, apical ramifications, or a cystic component—conditions that may not resolve with orthograde therapy alone ^[2,3]. Periapical surgery was therefore indicated to remove persistent pathology and provide a hermetic apical seal. The use of MTA as a retrograde filling material is supported by a robust body of evidence demonstrating favorable sealing ability, biocompatibility, and promotion of hard tissue formation ^[7,8]. Systematic reviews and meta-analyses report high success rates for periapical surgery when MTA is used as the retrograde material, particularly when modern microsurgical techniques and ultrasonic preparation are employed ^[9,12].

Antibiotic prescribing in endodontic surgery should be judicious; in this case, a short 5-day course of amoxicillin was prescribed postoperatively in accordance with common clinical practice for uncomplicated periapical surgery to reduce postoperative infection risk and patient discomfort ^[13]. Analgesics were prescribed for pain control. The early radiographic signs of bone fill at 1.5 months and progressive healing at 3 months are consistent with expected short-term outcomes following successful periapical surgery with MTA ^[10,12]. The limitations of this report include the relatively short follow-up and CBCT would better document complete bone regeneration and long-term tooth survival ^[9,10]. Nevertheless, the clinical and radiographic course in this case aligns with contemporary evidence supporting combined nonsurgical and surgical management for persistent periapical lesions after trauma.

CONCLUSION

A combined treatment strategy of staged nonsurgical root canal therapy with multiple calcium hydroxide dressings, followed by periapical surgery and MTA retrograde filling, resulted in clinical resolution and progressive radiographic healing of a chronic periapical lesion in a traumatized permanent maxillary central incisor. Short-term follow-up demonstrated favourable outcomes; longer follow-up and additional case series are recommended to confirm long-term success.

CONSENT

Written informed consent was obtained from the patient for treatment and for the publication of anonymized clinical information and radiographs.

FIGURES:



Figure 1. Pre-RCT IOPA (baseline):

Radiograph after orthograde. Large periapical radiolucency associated with tooth #11



Figure 2. Post-RCT IOPA (preoperative):

obturation documenting the quality of the root filling before surgical planning.



Figure 3. Immediate postoperative IOPA: Radiograph showing months: Early signs of MTA retrograde filling at the apex after periapical surgery



Figure 4. Postoperative follow-up at 1.5 months: bone fill and reduction in radiolucency

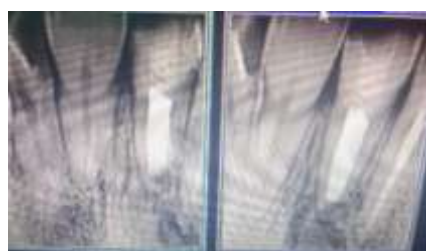


Figure 5. Postoperative follow-up at 3 months revealed progressive radiographic bone regeneration and further reduction of periapical radiolucency.

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