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Surgical management of an extensive periapical lesion using apicectomy, Mineral Trioxide Aggregate retrograde filling and Platelet-Rich Fibrin: A case report

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Abstract
Periapical inflammatory lesions are commonly associated with microbial infection of the root canal system. Although nonsurgical root canal treatment is the primary treatment approach, selected cases with extensive or persistent periapical pathology may require surgical intervention to manage the apical disease and retain the involved tooth. This case report describes the surgical management of an extensive periapical lesion associated with the maxillary right central incisor in a 47-year-old male patient. Preoperative clinical photographs, periapical radiographs and cone-beam computed tomography images were documented to assess the involved tooth and periapical region. Following access cavity preparation, working length determination, canal preparation and master cone verification, the root canal was obturated. Periapical surgery was subsequently performed using a Luebke–Ochsenbein flap. After reflection of the flap, the root apex was exposed and the surrounding granulation tissue was removed. Apical root resection was performed, followed by retrograde cavity preparation and placement of mineral trioxide aggregate as the root-end filling material. Autologous platelet-rich fibrin was prepared and placed in the surgical site as a biological adjunct. The flap was repositioned and sutured. The available clinical documentation records review and suture removal at one week, together with a postoperative radiograph, and a further radiographic assessment at three months. The case report presents the clinical sequence of conventional root canal treatment followed by apical surgery, root-end filling and placement of an autologous fibrin biomaterial. The supplied record does not contain complete baseline clinical findings, detailed material and procedural parameters, histopathological findings or quantified radiographic measurements. Therefore, a definitive healing classification cannot be assigned from the available documentation. The use of three-dimensional imaging contributed to documenting the extent of the lesion for treatment planning, while the flap design provided access to the anterior periapical region. The report also highlights the need to document clinical findings and surgical parameters systematically. Longer-term clinical and radiographic follow-up is necessary to assess the progression of periapical healing and establish the outcome of treatment.

Keywords: Apicectomy, periapical lesion, mineral trioxide aggregate, platelet-rich fibrin, endodontic surgery

Introduction

Apical periodontitis is an inflammatory condition of the periradicular tissues most commonly associated with microbial infection of the root canal system. Nonsurgical root canal treatment is the primary approach for managing teeth with pulpal and periapical disease. Nevertheless, persistent apical pathology may require surgical intervention in selected cases when nonsurgical management is inadequate or not feasible. Endodontic microsurgery combines apical root resection, root-end cavity preparation and placement of a root-end filling material to achieve an apical seal. Contemporary surgical techniques and biocompatible root-end materials have improved the predictability of surgical endodontic treatment.1,2

Mineral trioxide aggregate (MTA) is widely used as a root-end filling material because of its favourable biological properties and clinical performance. Clinical evidence has demonstrated favourable outcomes for MTA in endodontic microsurgery.1,3 Platelet-rich fibrin (PRF), an autologous platelet concentrate with a fibrin matrix, has also been used as a biological adjunct in oral surgical procedures.4,5 The present report describes the management of an extensive periapical lesion associated with the maxillary right central incisor using apicectomy, MTA retrograde filling and PRF placement.

Case Report

A 47-year-old male patient was evaluated for a periapical lesion associated with the maxillary right central incisor (FDI tooth 11). The clinical record supplied for this report contains preoperative intraoral photographs, periapical radiographs and CBCT images. The CBCT images were documented as showing an extensive periapical lesion in relation to tooth 11. Specific details of the presenting complaint, medical history, clinical tests, lesion dimensions and relationship to adjacent anatomical structures were not available in the supplied case record and should be added from the original patient chart before submission.

Following clinical and radiographic assessment, a treatment plan involving root canal treatment followed by periapical surgery was undertaken. Access cavity preparation and working length determination were performed. The master cone fit was checked, and the root canal was obturated. The available documentation does not specify the instrumentation system, irrigant concentrations, obturation technique or sealer used.

Surgical Procedure

The surgical site was prepared and local anaesthesia was administered. A Luebke–Ochsenbein flap outline was marked using an eosin pencil. The flap was raised to expose the periapical region and the root apex of tooth 11. The granulation tissue surrounding the root apex was removed. The available photographs document surgical exposure and tissue removal.

Apicectomy was performed, followed by preparation of a retrograde cavity at the resected root end. Mineral trioxide aggregate was placed as the retrograde filling material. The exact length of root resection, bevel angle, method of retrograde cavity preparation, MTA product and setting protocol were not specified in the supplied documentation and require confirmation from the operator.

Autologous PRF was prepared and placed in the surgical site. The preparation protocol, including blood volume, centrifugation speed and duration, was not recorded in the supplied case material. The flap was repositioned and sutured. Postoperative instructions were provided; the exact medication regimen and instructions should be confirmed from the clinical record.

Follow-up

The patient was reviewed after one week, when suture removal was documented and a postoperative radiograph was obtained. A further postoperative radiographic image was documented at three months. The supplied presentation includes these follow-up records but does not provide a formal description of symptoms, soft-tissue healing, percussion or palpation findings, or radiographic lesion measurements. Therefore, a definitive clinical or radiographic success classification cannot be assigned from the available documentation. Longer-term follow-up is recommended to assess progressive periapical healing.

Discussion

The present case demonstrates a combined nonsurgical and surgical approach to the management of an extensive periapical lesion associated with a maxillary anterior tooth. The decision to undertake apical surgery should be based on clinical and radiographic findings, the feasibility of nonsurgical retreatment, restorability of the tooth and patient-related factors. Endodontic microsurgery may provide a predictable treatment option in appropriately selected cases. A systematic review and meta-analysis reported favourable long-term outcomes for endodontic microsurgery, while also identifying prognostic factors such as tooth location, dentinal defects and interproximal bone level.2

The Luebke–Ochsenbein flap is a submarginal flap design that may be considered when preservation of the marginal gingiva is desirable, particularly in the aesthetic zone. Adequate flap design and reflection are essential to obtain access and permit atraumatic repositioning. The clinical photographs in this case document the flap outline, reflection and subsequent repositioning.

Root-end resection removes the apical portion of the root and facilitates inspection and preparation of the resected root surface. The objective of retrograde preparation and filling is to provide an effective seal between the root canal system and periradicular tissues. MTA has been evaluated in clinical studies and systematic reviews of endodontic microsurgery. A randomized controlled study reported favourable long-term outcomes for MTA as a root-end filling material, with a 4-year success rate of 91.6% in the MTA group.1 A further systematic review and network meta-analysis found MTA among the more effective root-end filling materials in modern surgical endodontic treatment.3 These findings support its selection in the present case.

PRF is an autologous fibrin-based platelet concentrate that can provide a scaffold containing platelets and leukocytes and may support wound healing through the release of growth factors.4,5 Its use in the present case was intended as a biological adjunct at the surgical site. However, because this is a single case and no comparison group or histological assessment was available, the independent contribution of PRF to the healing response cannot be determined.

A limitation of this report is the absence of detailed baseline clinical findings, exact surgical parameters, PRF preparation settings, histopathological diagnosis and quantified radiographic follow-up measurements. In addition, the documented follow-up extends only to three months, which is insufficient to establish long-term periapical healing. These details should be retrieved from the original clinical record wherever available. If the removed tissue was submitted for histopathological examination, the report should include the diagnosis; otherwise, the lesion should not be labelled as a radicular cyst or another specific histopathological entity.

Conclusion

Apicectomy with retrograde MTA placement and adjunctive PRF application was performed for an extensive periapical lesion associated with the maxillary right central incisor. The case documents the clinical sequence of endodontic treatment, surgical exposure, removal of periapical granulation tissue, root-end resection, retrograde filling and flap closure. The available three-month record is an early follow-up; longer-term clinical and radiographic assessment is necessary before the outcome can be considered definitive.

Acknowledgments

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Author Contributions

Manoj M D: Conceptualization, case selection, clinical diagnosis, treatment planning, clinical management, surgical procedures, endodontic treatment, hemisection, fixed prosthetic rehabilitation, clinical documentation, collection and interpretation of clinical and radiographic data, manuscript drafting, and preparation of figures.

Moksha Nayak: Supervision, clinical guidance, validation of treatment planning and procedures, critical review of the clinical findings, interpretation of results, manuscript review, and final approval of the manuscript.

Figure Legends

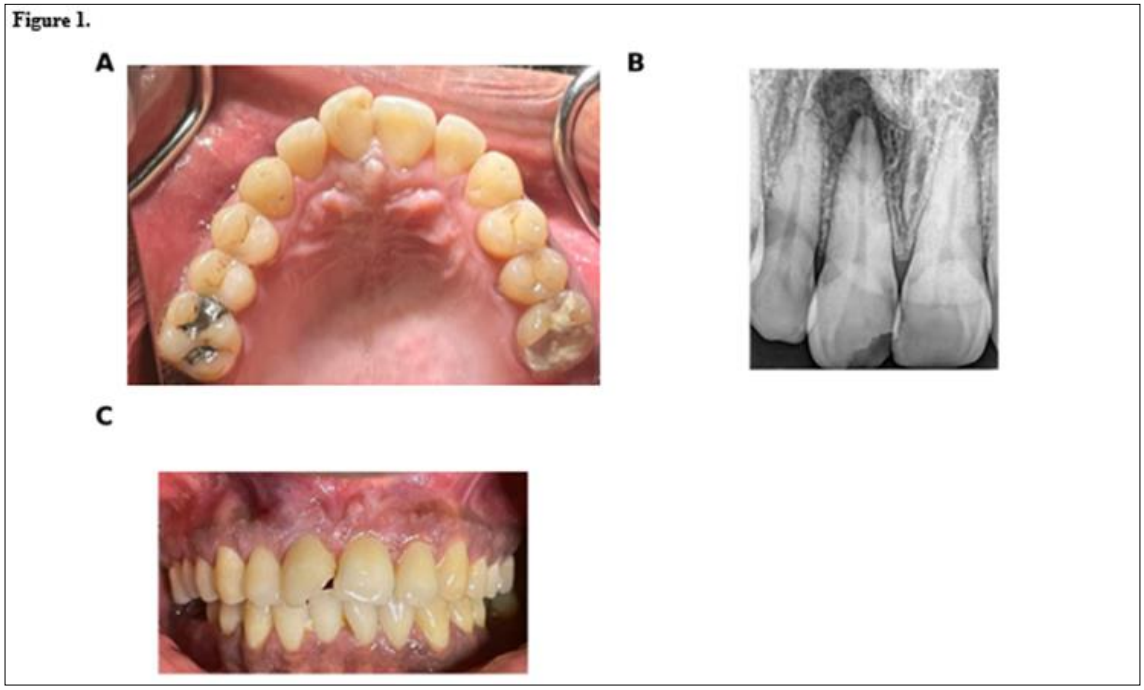


Fig 1: Preoperative clinical and radiographic documentation of the maxillary right central incisor region.

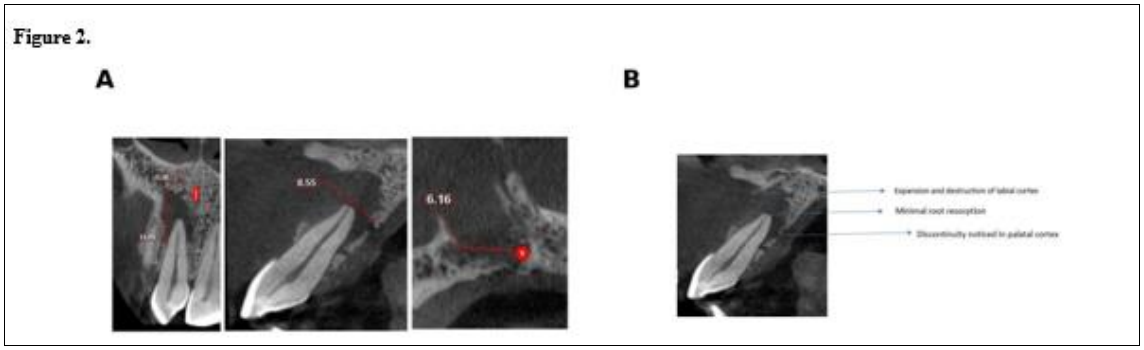


Fig 2: Cone-beam computed tomography images demonstrating the periapical lesion associated with tooth 11.

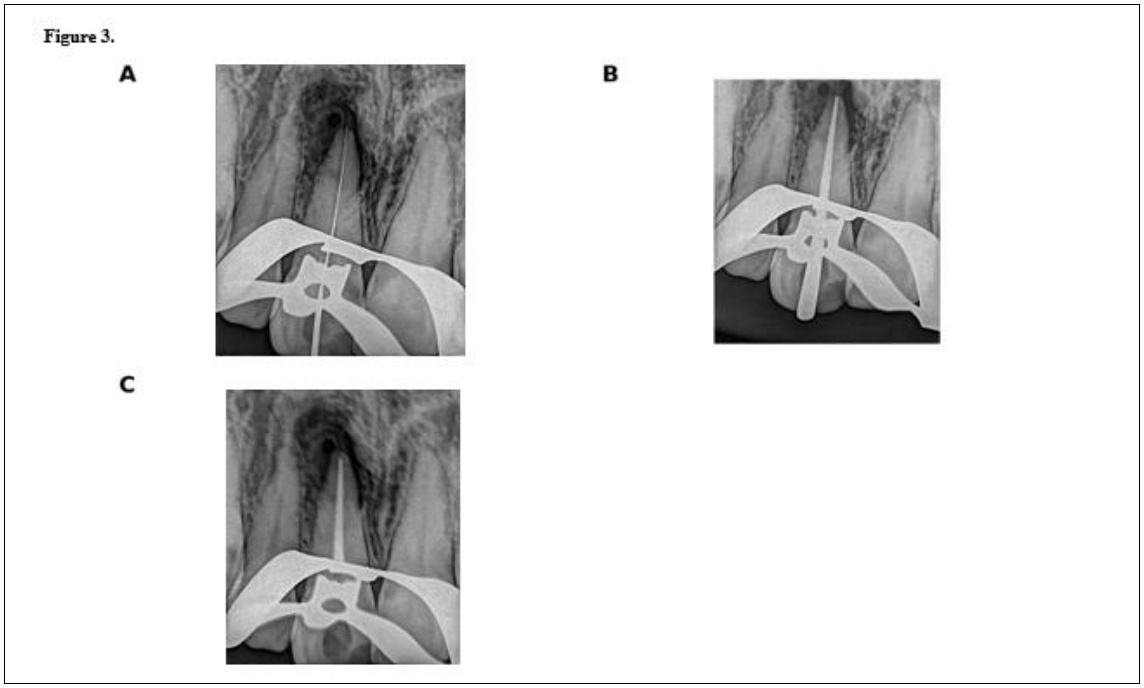


Fig 3: Endodontic treatment sequence: working length/master cone assessment and obturation.

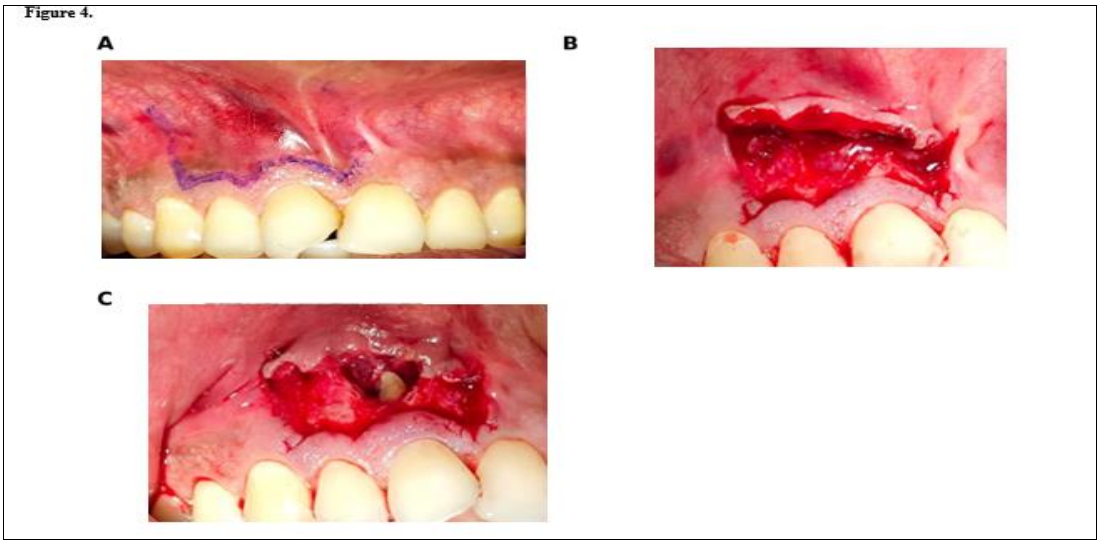


Fig 4: Luebke–Ochsenbein flap design and surgical exposure of the periapical region.



Fig 5: Removal of periapical granulation tissue.

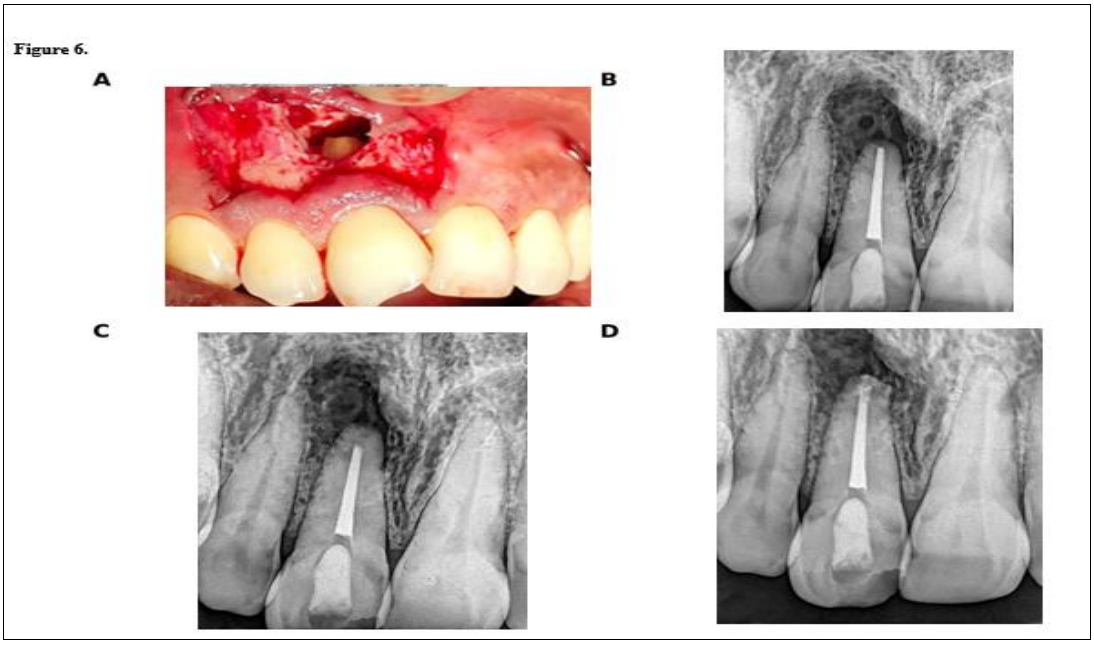


Fig 6: Apical root resection and retrograde cavity/root-end filling stages.

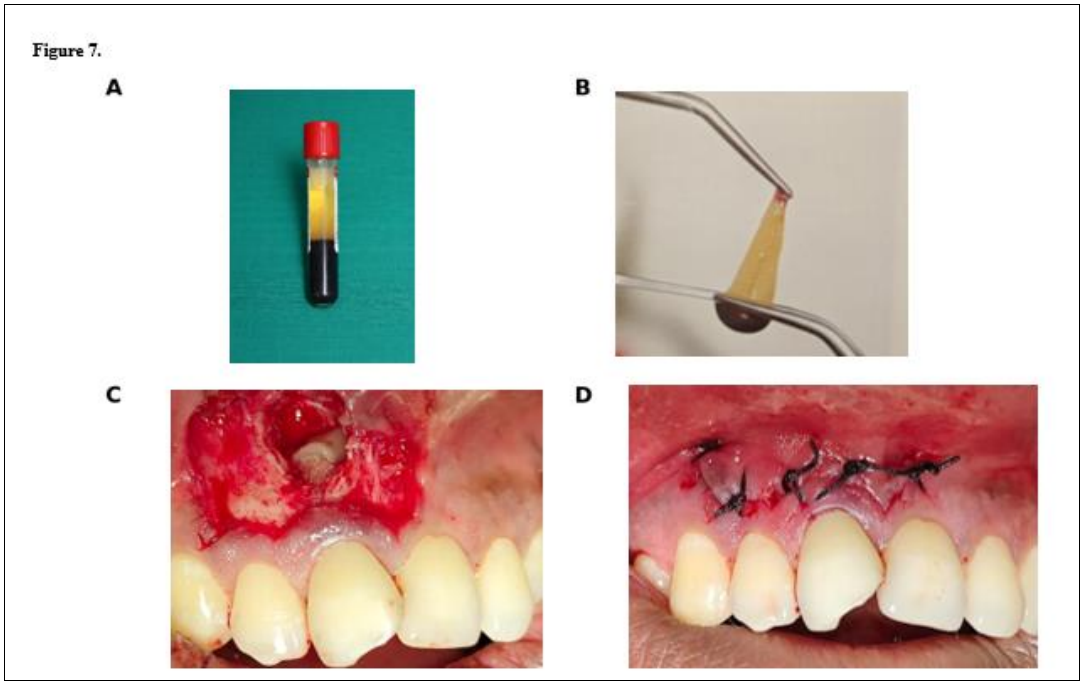


Fig 7: Preparation and placement of platelet-rich fibrin and surgical flap closure.



Fig 8: Postoperative clinical and radiographic documentation, including the available follow-up records.

Data Availability Statement

The clinical images and information supporting this case report are available from the corresponding author on reasonable request, subject to patient consent and institutional confidentiality requirements. Confirm that this statement reflects the actual data-access arrangements.

Conflict of Interest

no conflict of interest

Funding

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