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Case Report

Surgical Endodontics in the Management of Refractory Periapical Lesions: A Case-Based Perspective

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Abstract
Periapical lesions, commonly resulting from endodontic infections, present a considerable clinical challenge in dentistry. When standard root canal therapy does not effectively resolve these lesions, surgical intervention becomes necessary. Investigations such as radiography play an important role in navigating such lesions. This case report focuses on a failed root canal treatment in the upper incisor region, complicated by the development of a persistent periapical lesion. It details the surgical management through enucleation, addressing both the affected tooth and the associated pathology. The report emphasizes the crucial role of accurate diagnosis, suitable imaging, and thorough treatment planning in managing periapical lesions and highlights the importance of routine radiographic assessment, particularly in asymptomatic or inadequately responding endodontic cases.

Keywords: *Post-endodontic failure, periapical lesion, radicular cyst.*

INTRODUCTION:
Periapical lesions are a frequent consequence of endodontic infections, typically manifesting as chronic apical periodontitis. These lesions arise from microbial colonization of the root canal system, which triggers an inflammatory response and subsequent bone resorption.[1] Inadequate irrigation and incomplete filling of the root canal system can lead to the development or persistence of periapical lesions. According to current literature, the prevalence of apical periodontitis in root canal–treated teeth ranges from 16% to 61%.[2] In cases where root canal therapy is not feasible particularly when persistent exudation continues despite thorough chemo mechanical debridement periradicular surgery may be required to ensure favorable treatment outcomes.[3] The treatment and prognosis of periapical lesions are strongly associated with the success of root canal treatment and are evaluated through radiographic controls.Periapical lesions represent a spectrum of pathological conditions that develop in response to pulpal infection or necrosis. Based on clinical, histopathological, and radiographic characteristics, these lesions commonly manifest as radicular cysts, periapical granulomas, or abscesses.[4,5]

Accurate diagnosis and effective management of periapical lesions are essential to prevent such outcomes. Surgical intervention is critical in managing periapical lesions that are unresponsive to conventional endodontic treatment. By combining surgical techniques with contemporary endodontic principles, clinicians can enhance treatment outcomes.6 This article discusses the indications, techniques, and outcomes of surgical management of periapical lesions, highlighting its importance in clinical practice.

CASE REPORT:
A 51-year-old man presented to a private hospital with a five-month history of constant pain and swelling in the maxillary anterior region. Medical history included systemic hypertension, dyslipidaemia, rheumatic heart disease with severe mitral stenosis (post-PTMC) and paroxysmal atrial fibrillation, as well as gastro-oesophageal reflux disease, all controlled with medication. The patient's previous dental history revealed that root canal treatment had been performed elsewhere on teeth

11, 12, and 21 approximately six months prior. An intraoral periapical radiograph showed satisfactory obturation of teeth 11 and 12. No abnormalities were noted on extraoral examination. Intraorally, a well-circumscribed, fluctuant, and inflamed swelling was present on the labial mucosa adjacent to teeth 11 and 12, with tenderness on palpation. One week later, due to persistent pain and swelling, a CBCT scan was conducted, which revealed a well-defined lesion measuring 12 × 12 mm at the apices of teeth 11 and 12 (Figure 1). Based on history, examination, and imaging, an infected periapical lesion associated with teeth 11 and 12 was diagnosed.

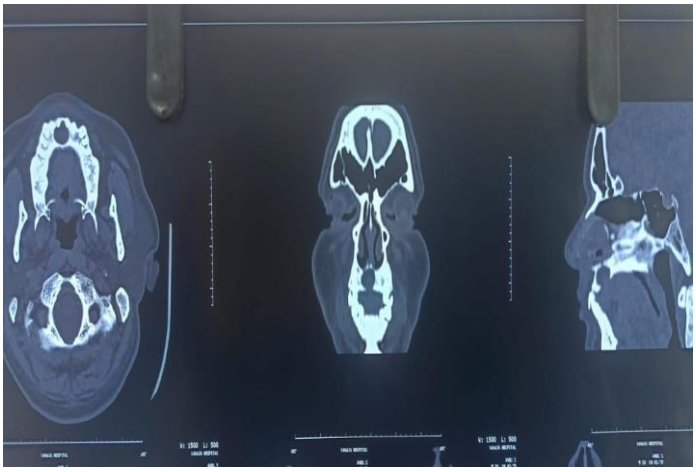

Figure 1: CBCT of the anterior maxillary region revealing a well-defined radiolucency concerning the apices of teeth 11 & 12

The patient proceeded with general anaesthesia. A full-thickness mucoperiosteal flap was raised to expose the periapical lesion of 11 and 12. The cystic mass was carefully dissected en bloc, and the socket was thoroughly curetted and irrigated with povidone-iodine, followed by saline. (Figure 2A &2B) Haemostasis was achieved and the flap was repositioned and sutured with 3-0 black silk. (Figure 2C) No teeth were extracted during the surgical procedure, including 11 and 12. Root canal therapy was completed on 21, and the calcium hydroxide dressing in 11 was renewed. The treatment focused on the enucleation of the periapical lesion while maintaining the structural integrity and function of the affected teeth.

Figure 2: (2A) The periapical lesion was enucleated, and the area was inspected for any remaining infected tissues or debris. (2B) Complete enucleation of the lesion. (2C) Closure of the surgical site with sutures and haemostasis achieved.

The excised lesion was submitted for histopathological examination, which revealed a lining of stratified squamous epithelium in an arcading pattern with an underlying lymphocytic infiltrate. No evidence of atypia or malignancy was observed. A final impression of radicular cyst was made, and the patient remains under periodic review with satisfactory healing and no recurrence to date.

DISCUSSION:

Periapical cysts, also known as radicular cysts or true cysts, are a type of inflammatory jaw cyst that occurs at the apex of teeth with necrotic pulp due to infection. These cysts account for approximately 52 – 68 % of all jaw cysts, with a higher prevalence in the anterior maxilla compared to the mandible.[7] Post-treatment endodontic disease (PTED) is characterized by the presence of an inflammatory periradicular lesion in a Previously endodontically treated tooth, where the lesion is no longer considered to be in the healing process.[8] The etiology of PTED can be attributed to various factors, including intraradicular infection, extraradicular infection, true cyst, cholesterol crystals, and foreign body reactions. When endodontic treatment is performed to accepted clinical standards, it can achieve a success rate of approximately 90%.[9] However, a recent cross-sectional study conducted across multiple countries reported that apical periodontitis was present

in up to 64.5% of Endodontically treated teeth.[10] Notably, the quality of root fillings and coronal restorations is the two most critical factors influencing the development of periapical lesions in association with root-filled teeth.[11,12] In the present case, despite previous endodontic treatment of teeth 11 and 12, the patient developed a persistent periapical lesion that was unresponsive to intracanal medicament. This indicates that the infection had likely progressed beyond the confines of the root canal system into the surrounding periapical tissues, forming a cystic lesion that necessitated surgical enucleation.

Cystic lesions are commonly treated via surgery. Choosing the best management of such lesions, which focuses on the lowest recurrence rates and least morbidity, has always been controversial and debatable for dentists as well as researchers. Although various less invasive procedures have been proposed, aggressive forms of management like enucleation with/without curettage, along with adjunctive uses of chemical/cryocauterisation or resections, have, so far, been the most reliable and effective methods to treat true cysts. Surgical enucleation and curettage have been carried out for many years. Though the method of enucleation is proposed for smaller cysts, it should also be used whenever possible, as it's proven to have superior advantages over marsupialization, a surgical method commonly used for treating large cysts. The most common disadvantage includes recurrence and spillage of intracystic contents due to incomplete enucleation.[13] The surgical treatment modalities for periradicular cysts include the enucleation of small lesions, marsupialization to decompress large cysts, and a combination of these two modalities. Marsupialization and decompression decrease the size of the lesion to facilitate its removal, with lower risks of damaging the teeth and adjacent anatomic structures.[14] Enucleation is advocated because marsupialization is associated with the risk of residual cystic cells with malignant potential.[15.16] Multiple factors, including prognosis, size of periapical lesion, apical seal, and techniques and materials used to treat the tooth, decide the success rate of the surgical treatment.

Overall, this case emphasizes that accurate diagnosis, appropriate use of advanced imaging, timely surgical intervention, and close interdisciplinary coordination are key factors in the successful management of persistent periapical lesions, particularly in endodontically treated teeth with complex medical histories.

CONCLUSION:

Periapical lesions are commonly encountered in dental practice and require accurate diagnosis, appropriate treatment, and consistent follow-up to prevent potential complications, including neoplastic transformation of radicular cysts. Successful enucleation of these lesions depends on careful surgical planning, precise technique, and thorough postoperative care. This approach not only eliminates infection but also supports the preservation of oral structures and promotes long-term oral health.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest related to this case report.

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