

## Bilateral symmetrical radicular cyst in the mandibular premolar regions: A case report with 3-year follow-up.

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### ABSTRACT

**Background:** A radicular cyst (RC), also known as a periapical cyst, is the most common type of odontogenic cyst. It typically develops at the apex of a tooth's root due to chronic inflammation following pulp necrosis, often resulting from untreated dental caries or trauma. A radicular cyst is commonly found in anterior maxilla, not commonly seen in the mandible. The bilateral symmetrical presentation of this cyst is quite rare. This case report emphasizes the surgical role in the early diagnosis and treatment of such lesions and the overall oral rehabilitation of such mutilated dentition.

**Case Report:** This report describes the case of a 60-year-old healthy African male who presented with a rare case of bilateral symmetrical radicular cyst in the mandibular

premolar region along with advanced periodontal disease and hopeless remaining dentition. The patient management comprised surgical enucleation of the cystic sac for histopathologic examination, extraction of associated remaining roots, and total mouth extraction under local anesthesia followed by bone augmentation and implant-supported overdenture prosthesis. This case was followed up at 6, 12, 24 and 36 months. Radiographic analyses revealed complete healing at the sites of the cyst's enucleation with no signs of recurrence or preapical pathology.

**Conclusions:** This case presented a common condition in an uncommon age group, sex, location, and presentation. It highlights the importance of clinical and radiographic diagnosis and reinforces the role of histopathologic examination. This case also demonstrates the scope of dental management and comprehensive care of a dental patient with a hopeless dentition.

**Keywords :** Case report; Bilateral mandibular radicular cysts; Periapical cysts; Premolar radicular cysts; Surgical enucleation; Implant overdenture prosthesis.

### INTRODUCTION

#### Background

Radicular cysts (or periapical cysts) are the most prevalent inflammatory cysts, originating from epithelial remnants in the periodontal ligament due to periapical periodontitis following pulp necrosis [1, 2]. Typically asymptomatic, these cysts are often discovered incidentally on a plain OPG during investigations for other conditions. However, if they grow, they can lead to tooth mobility, displacement, and, if infected, severe pain and swelling [3-5]. If untreated, they may result in significant complications, such as ameloblastoma or even squamous cell carcinoma [6, 7]. The swelling is slow-growing, bony, and hard to palpate, but it eventually becomes rubbery and fluctuant [8]. Radicular cysts represent approximately 52% to 68% of all jaw cysts [9-11], with the highest incidence occurring in the third and fourth decades of life and a male predominance [12, 13]. They are more frequently found in the maxillary region compared to the mandibular region and can occur at any tooth-bearing site of the jaw [14]. These cysts may heal spontaneously following endodontic treatment

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or extraction. Nonetheless, some experts recommend complete surgical enucleation to remove all epithelial remnants and prevent future issues such as residual cysts or bone erosion [15]. Interestingly, bilateral symmetrical radicular cysts are rare, as these cysts generally develop in response to localized factors like infection or trauma affecting a single tooth or group of teeth. This paper describes a case of bilateral symmetrical radicular cysts associated with the right and left mandibular second premolars, including their management, particularly in the context of comprehensive full-mouth rehabilitation.

### CASE REPORT

A 60-year-old African male reported to the restorative dentistry department with a chief complaint of missing teeth in both upper and lower arches and difficulty in chewing. The patient desired comprehensive rehabilitation for his dentition with a prosthesis to restore esthetics and chewing efficiency. The patient presented with no history of pain or any episodes of swelling or foul discharge in the mouth. Past dental history includes a few extractions without any known complications. The medical history was non-contributory. In the general physical examination, no abnormalities were detected, and a system review showed no signs of medical problems. All his vitals were within normal. An extraoral examination and head and neck cancer screening revealed normal findings with adequate mouth opening, no lymph node involvement, or extraoral swelling. The temporomandibular joints (TMJ) were normal bilaterally. The patient reported that he is a chronic heavy smoker (more than 20 cigarettes per day) and that he does not brush or floss his teeth regularly. Intra-oral examination, including oral cancer screening revealed multiple missing teeth and remaining root stumps on both the maxilla and mandible due to dental caries and periodontal pathology. Further, multiple teeth had grade III mobility due to generalized severe bone loss diagnosed as generalized stage IV, grade C periodontitis [16]. The orthopantomogram (OPG), showed bilateral well-defined periapical radiolucent lesions associated with remaining root stumps of teeth # 20 and 29. The lesions were surrounded by corticated borders, measured approximately 1 cm each, and were round and symmetrical (Fig. 1).

**Figure 1**



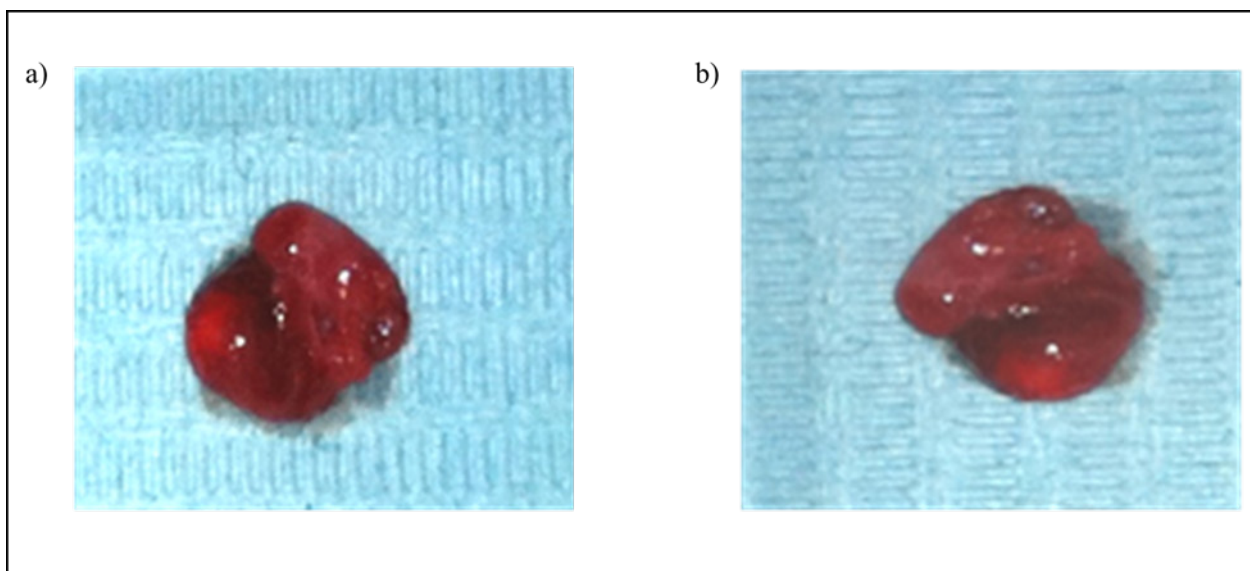
**Figure 1.** Pre-operative OPG showing well-defined bilateral symmetrical radiolucency related to remaining root stumps of teeth # 20 and 29

The intra-oral examination also revealed no pain or swelling associated with radiographic findings. Therefore, based on patient's clinical and radiographic findings, the provisional diagnosis of bilateral mandibular radicular cysts was made. Differential diagnosis of odontogenic keratocystic tumor, unicystic ameloblastoma, and central giant cell granuloma was considered. After careful evaluation of the remaining dentition, root stumps and all periodontally compromised teeth were deemed non-restorable, necessitating total mouth extraction and restoring the entire dentition with maxillary and mandibular implant-supported overdentures. Therefore, a comprehensive treatment was carried out in phases, starting with the preparatory/disease control phase, which encompasses deep scaling and root planning (SRP) to reduce inflammation and bacterial load in the mouth. The aforementioned preparatory phase also includes smoking cessation, which is crucial for implant success and hinders the progression of periodontal disease. The second phase is a surgical phase, which includes total mouth extractions,

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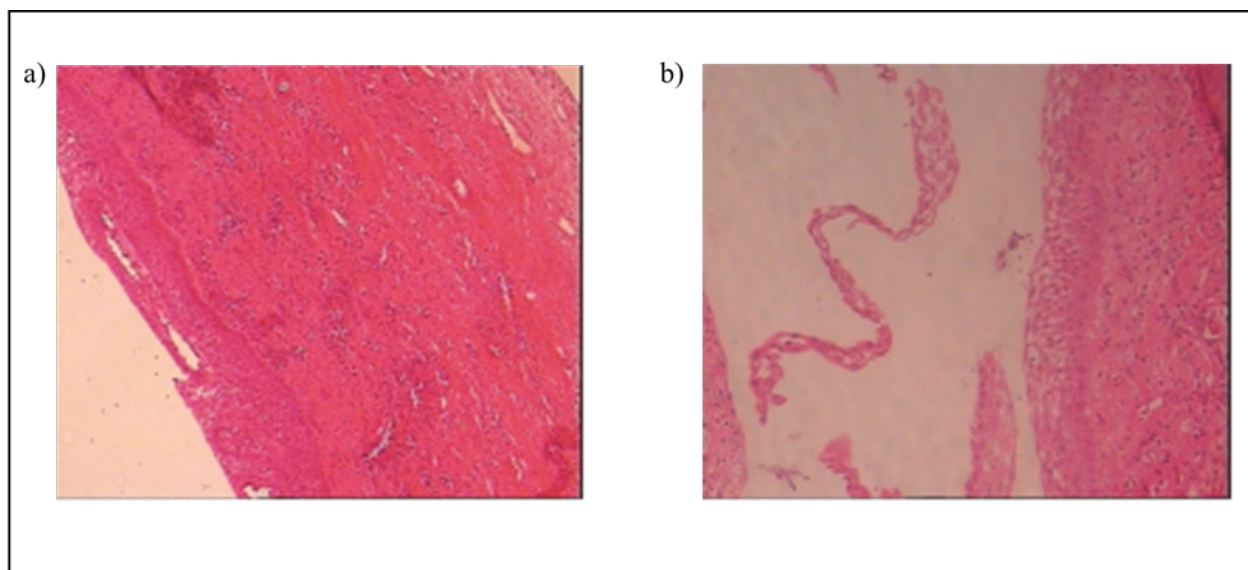
enucleation of the preapical symmetrical lesions related to root stumps of teeth # 20 and 29, curettage of the socket, and sending the specimen to the histopathological lab for further analysis (Fig. 2). Four maxillary and two mandibular implants and bone augmentation were performed to support future implant-supported overdentures. Immediate maxillary and mandibular dentures were inserted to help with healing and provide a temporary solution for mastication and esthetics. After successful implant osteointegration, the restorative phase was carried out by constructing maxillary and mandibular locator overdentures [17]. The histological examination revealed that the pathological tissues from both lesions were consistent with that of the radicular cyst (Fig. 3). The patient was followed up for three years post-operatively without any complications (Fig. 4).

**Figure 2**



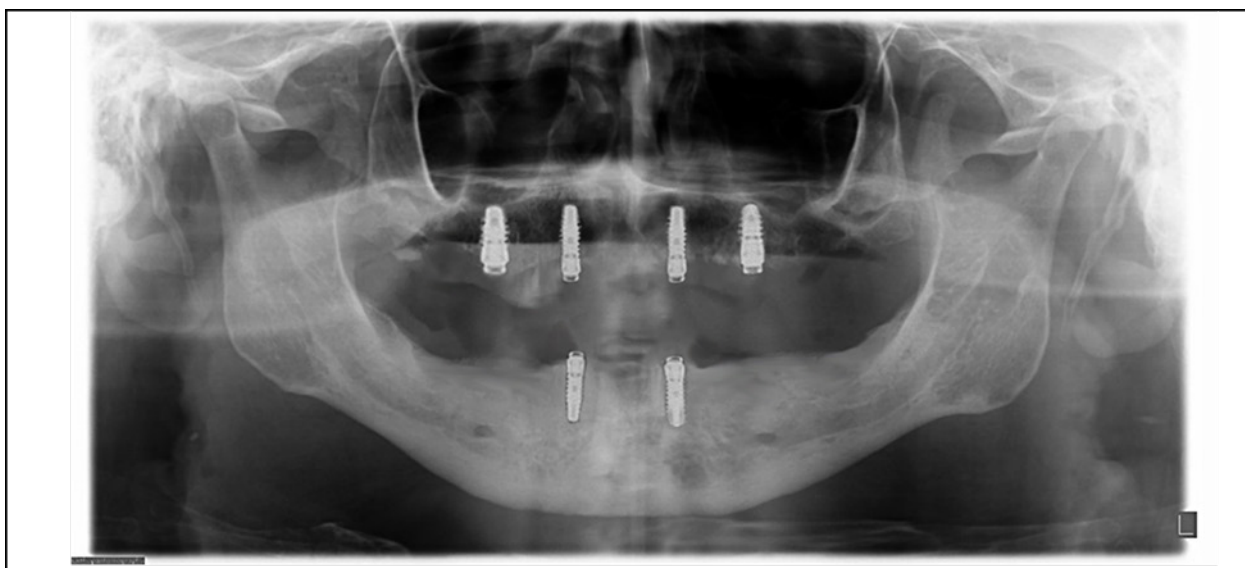
**Figure.2.** The enucleated symmetrical cysts associated with the a) right and b) left second premolars' remaining root stumps.

**Figure 3**



**Figure.3.** Histopathologic photograph of the enucleated cysts (H&E stain,  $\times 10$ )

Figure 4



**Figure.4.** Postoperative OPG three years after surgery showed good healing and no recurrence of the cystic lesions.

## DISCUSSION

The case presented in this paper describes the rare occurrence of bilateral symmetrical radicular cysts in the mandibular premolar regions in which the patient's age, sex, size of the cyst, and radiographic presentation are considered rare. Radicular cysts are commonly believed to form from the proliferation of epithelial cell rests of Malassez in inflamed periradicular tissues [18-20]. Typically, radicular cysts do not exceed 1 cm in size and are more frequently observed in patients aged 30 to 50 years, with a higher incidence in the maxillary anterior region [21]. This paper highlights the importance of diagnosing and managing radicular cysts, particularly in comprehensive mouth rehabilitation cases.

Radicular cysts develop through three stages: initiation, formation, and enlargement. The initiation phase involves the proliferation of epithelial rests of Malassez in response to chronic inflammation from non-vital teeth. This inflammatory reaction triggers a cascade of inflammatory cytokines [22]. As the epithelial cells proliferate, they create an epithelial lining around a central lumen. The center of this mass often degenerates due to insufficient blood supply, leading to liquefactive necrosis and cystic cavity formation. The cyst continues to expand as fluid and breakdown products accumulate, increasing osmotic pressure, which causes resorption of surrounding bone and further enlargement of the cyst [23, 24].

Histologically, radicular cysts are lined with non-keratinized stratified squamous epithelium, which may show varying thickness and often extend into the underlying connective tissue as rete ridges. Further, the epithelial lining frequently contains inflammatory cells, including lymphocytes, plasma cells, and occasionally neutrophils. Cholesterol clefts, foam

cells, and multinucleated giant cells may also exist [25]. The cyst wall is composed of dense fibrous connective tissue, which may exhibit varying degrees of collagenization and fibroblastic activity, along with a chronic inflammatory infiltrate of lymphocytes, plasma cells, and macrophages [26]. Furthermore, areas of hyalinization, or glassy, pink-staining regions, may be observed in the fibrous capsule. The cyst lumen typically contains a pale yellow, protein-rich fluid that may include cholesterol crystals, cellular debris, and sometimes necrotic tissue. Cholesterol crystals are typically needle-shaped and may be surrounded by a foreign body giant cell reaction. Dystrophic calcification can occur within the cyst wall, especially in long-standing cases. Moreover, granulation tissue may be present near epithelial discontinuities or active expansion areas. Secondary infections can lead to acute inflammatory cell infiltration, particularly neutrophils, resulting in abscess formation or further epithelial damage [25, 27, 28].

The bilateral symmetrical occurrence of this lesion is highly unusual, particularly in the mandibular premolar regions. In the literature, a few bilateral radicular cyst cases have been reported occurring in the mandibular molar region. These cysts were large and expanded to involve multiple teeth associated with root resorption and intraoral expansion [29-31]. However, the current case report presents smaller symmetrical radicular cysts confined to the second premolar root stumps with no expansions or root resorptions.

It is thought that specific individuals may be more prone to developing multiple radicular cysts [22]. A small percentage of non-vital teeth cases develop radicular cysts, supporting the theory that some individuals are more susceptible to these lesions. Additionally, immune system competency is crucial in preventing cyst formation; individuals with compromised

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immune responses may be more likely to develop such lesions. Genetic predisposition may also play a role, as hereditary dental defects have been linked to developing single or multiple radicular cysts [23].

Various treatment options are available for radicular cysts, including surgical endodontic treatment, tooth extraction, enucleation with primary closure, and marsupialization followed by enucleation [32-34]. In this case, bilateral surgical enucleation with primary closure was performed in the mandibular premolar regions, which showed a successful approach to treating such lesions.

## CONCLUSIONS

Radicular cyst is a common odontogenic cyst found in the maxillary anterior region. However, radicular cysts in the mandible usually go unnoticed and rarely exceed the palpable dimension. This case illustrates a common condition in an uncommon age group, location, and presentation. It emphasizes the importance of the radiographic examination and formulating a differential diagnosis. This report also reinforces the role of histopathologic examination and demonstrates the scope of dental management and comprehensive care of a dental patient.

## Abbreviations

RCs : Radicular cysts

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## Authors' contributions

AMA performed the surgery and the prosthetic part, collected data, carried out literature search and drafted the manuscript. LMMA revised the manuscript for publication. All authors read and approved the final manuscript for publication.

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## Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent to participate

Informed consent about clinical management was obtained from the patient in this case. Written informed consent for publication of their details was obtained from the patient and was compliant with the hospital.

### Consent for publication

A written informed consent for publication was obtained from the patient to publish all clinical data and any accompanying images and also a written consent to publish this information was obtained from study participant.

## Competing interests

All authors declare that they have no competing interests

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