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Case Report

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Histopathological Analysis of Asymptomatic Huge Radicular Cyst: Contributory Factors and Unique Feature for an Adult Libyan Patient

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Abstract

Background: Radicular cysts are the most prevalent odontogenic cystic lesions of the jaws, typically arising from epithelial remnants in periapical granulomas following pulpal necrosis. While usually asymptomatic and small, they can occasionally attain considerable dimensions, presenting diagnostic and therapeutic challenges. This report details the management of a massive, asymptomatic radicular cyst in a young adult, emphasizing the critical role of advanced imaging and a multidisciplinary approach. **Case Presentation:** A 22-year-old Libyan male presented with a 6-month history of a painless, progressively enlarging swelling in the left anterior maxilla. Clinical examination revealed a significant palatal swelling extending from teeth #22 to #25. Cone-beam computed tomography (CBCT) imaging delineated a well-defined, corticated unilocular radiolucency measuring approximately 3.5 x 2.8 cm, causing substantial palatal bone erosion. The involved teeth (#22, #23, #24) were non-vital. The treatment plan comprised preoperative endodontic therapy on the involved teeth, followed by CBCT-guided surgical enucleation via a full-thickness mucoperiosteal flap. Histopathological analysis confirmed the diagnosis of a radicular cyst, showing a lining of non-keratinized stratified squamous epithelium with a dense, chronically inflamed fibrous capsule. **Conclusion:** This case underscores that radicular cysts, though common, can present with extensive bony destruction without classic symptoms. It highlights the indispensable utility of CBCT for accurately assessing lesion extent and anatomical relationships preoperatively. A combined endodontic-surgical strategy ensured complete removal of the pathologic tissue while preserving the involved teeth and surrounding structures, resulting in successful rehabilitation and patient satisfaction. Long-term follow-up is essential to monitor healing and ensure the absence of recurrence.

Keywords: Oral Histopathology, Radicular cyst; Periapical cyst; Cone-beam computed tomography; Surgical enucleation; Histopathology; Odontogeniccyst.

Introduction

A cyst is pathologically defined as a pathologic cavity, often fluid-filled, lined by epithelium, and enclosed by a connective tissue wall.[1] Within the maxillofacial region, cysts are broadly classified as odontogenic or non-odontogenic in origin. The radicular (periapical) cyst is the most common odontogenic cyst, accounting for 52% to 68% of all jaw cysts, and is classified as an inflammatory cyst derived from odontogenic epithelial remnants (rests of Malassez).[2,3] It develops as a sequela to pulpal necrosis, usually consequent to dental caries or trauma, which initiates a chronic inflammatory periapical response.[4]

Clinically, radicular cysts are frequently asymptomatic and are often discovered incidentally during routine radiographic examinations.[5] When symptomatic, they may present as a slow-growing swelling, occasionally associated with tooth mobility or mild discomfort. Their radiographic presentation is typically a well-circumscribed, unilocular radiolucency associated with the apex of a non-vital tooth.[6] However, they can sometimes achieve considerable size, causing significant bony expansion and erosion of cortical plates, which complicates diagnosis and management.[7]

The introduction of cone-beam computed tomography (CBCT) has revolutionized the diagnostic paradigm in

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maxillofacial surgery and endodontics. CBCT provides high-resolution, three-dimensional imaging with markedly lower radiation exposure compared to conventional medical CT.[8] It offers unparalleled detail regarding the exact size, morphology, and extension of lesions, their relationship to vital structures (e.g., maxillary sinus, nasal floor, neurovascular bundles), and the integrity of surrounding bony cortices—all critical for precise surgical planning and predicting potential complications.[9]

This case report presents the diagnosis and management of a massive, asymptomatic radicular cyst in a young Libyan adult. It aims to elucidate the contributory factors leading to such extensive growth, demonstrate the pivotal role of CBCT in preoperative planning, and discuss the histopathological features that confirm the diagnosis. The successful interdisciplinary approach combining endodontics and oral surgery is detailed, reinforcing the principles of contemporary management for extensive odontogenic cystic lesions.

Case Presentation

A 22-year-old Libyan male presented to the oral and maxillofacial surgery clinic at Al-Jalaa Trauma Hospital with a chief complaint of a painless swelling in the left upper anterior region of his jaw. The swelling was first noted approximately six months prior and had been gradually increasing in size. The patient's dental history was significant for multiple visits to private dental clinics over the preceding six months, where he was repeatedly prescribed antibiotics for the persistent swelling, with no definitive treatment undertaken. His medical history was unremarkable (no systemic illnesses or allergies reported), and he was a heavy smoker.

Clinical Examination

Extraoral examination revealed no facial asymmetry or lymphadenopathy. Intraoral examination disclosed a significant, dome-shaped, fluctuant swelling on the palatal aspect, extending from the region of tooth #22 (maxillary left lateral incisor) to tooth #25 (maxillary left first premolar). The swelling did not cross the midline (Figure 1). The overlying mucosa appeared normal without ulceration or sinus tract formation. The buccal vestibule in the corresponding area was normal, with no swelling or fistulous opening. Teeth #22, #23 (maxillary left canine), and #24 (maxillary left first premolar) exhibited non-vitality upon thermal and electric pulp testing. A mesioproximal carious lesion was present on tooth #22. Oral hygiene was fair, with moderate plaque and staining.

Figure 1. Preoperative intraoral occlusal view showing the dome-shaped, fluctuant palatal swelling extending from tooth #22 to #25.

Radiographic Investigation:

A panoramic radiograph (Figure 2) revealed a large, well-defined, corticated radiolucency in the periapical region associated with the apices of teeth #22, #23, and #24. To precisely assess the three-dimensional extent of the lesion, a CBCT scan was obtained. The CBCT images (axial, coronal, and sagittal views, Figure 3) demonstrated a unilocular, cystic lesion measuring approximately 3.5 cm (mesiodistal) x 2.8 cm (superoinferior), causing substantial erosion of the palatal bone plate. The lesion had well-corticated margins and was in close proximity to, but not invading, the nasal floor. The findings were highly suggestive of a large radicular cyst.

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Figure 2. Panoramic radiograph revealing a large, well-corticated radiolucency (arrow) associated with the apices of teeth #22, #23, and #24.

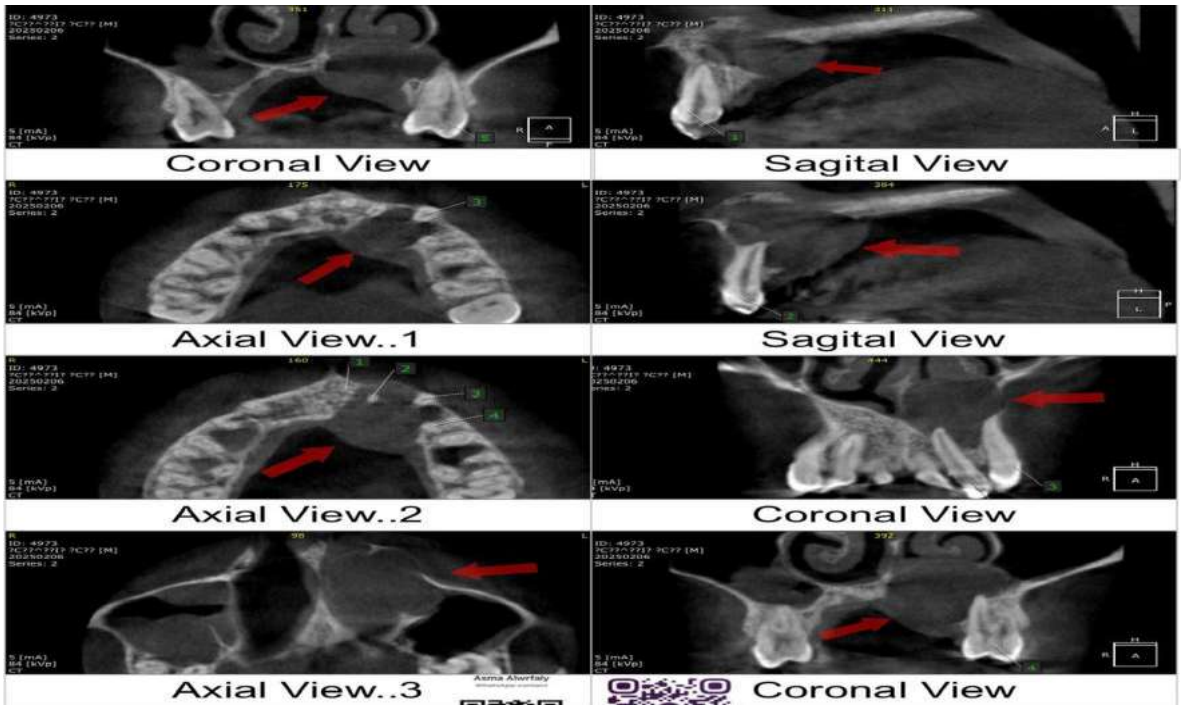

Figure 3. Cone-beam computed tomography (CBCT) images. (A) Axial section, (B) Coronal section, (C) Sagittal section, demonstrating the full extent of the cystic lesion and its relationship with the palatal bone and nasal floor.

Treatment Plan and Surgical Intervention:

A multidisciplinary treatment plan involving endodontics and oral surgery was formulated and explained to the patient, who provided informed consent. The plan consisted of: 1) completion of endodontic therapy on teeth #22, #23, and #24; 2) surgical enucleation of the cystic lesion; and 3) a course of postoperative antibiotics.

First, conventional root canal treatment was performed on the three involved teeth under rubber dam isolation. Biomechanical preparation was completed, and the canals were obturated with gutta-percha and a resin-based sealer.

One week following endodontic therapy, the patient was scheduled for surgery. Under local anesthesia (2% Lidocaine with 1:80,000 epinephrine), a crevicular incision was made from tooth #21 to #25, with a vertical

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releasing incision mesial to #21. A full-thickness mucoperiosteal flap was raised, revealing a substantial bony window over the palatal cortex (Figure 4A). The cystic lining was carefully dissected from the bony walls using periosteal elevators and curettes. The lesion was enucleated in toto, along with all associated granulation tissue. The bony cavity was thoroughly irrigated with sterile saline. The flap was repositioned and closed with interrupted 3-0 silk sutures (Figure 4B). The enucleated specimen was submitted in 10% neutral buffered formalin for histopathological examination. The patient was prescribed amoxicillin-clavulanate (875/125 mg twice daily for 5 days) and ibuprofen for pain management, along with standard postoperative instructions.

Figure 4. Intraoperative views. (A) Raised a full-thickness mucoperiosteal flap exposing the cystic cavity after removal of the thin palatal bone. (B) Closure of the surgical site with sutures.

Histopathological Findings:

Gross examination revealed a ragged, brownish soft tissue fragment measuring 3.2 x 2.5 x 0.5 cm. Microscopic examination (Figure 5) showed a cystic cavity lined predominantly by non-keratinized stratified squamous epithelium of variable thickness. In several areas, the epithelial lining was discontinuous, replaced by granulation tissue. The underlying fibrous capsule was densely infiltrated by a chronic inflammatory cell infiltrate, predominantly composed of lymphocytes and plasma cells, with occasional cholesterol clefts noted. No evidence of dysplasia or malignancy was observed. The histopathological features were diagnostic of a radicular cyst.

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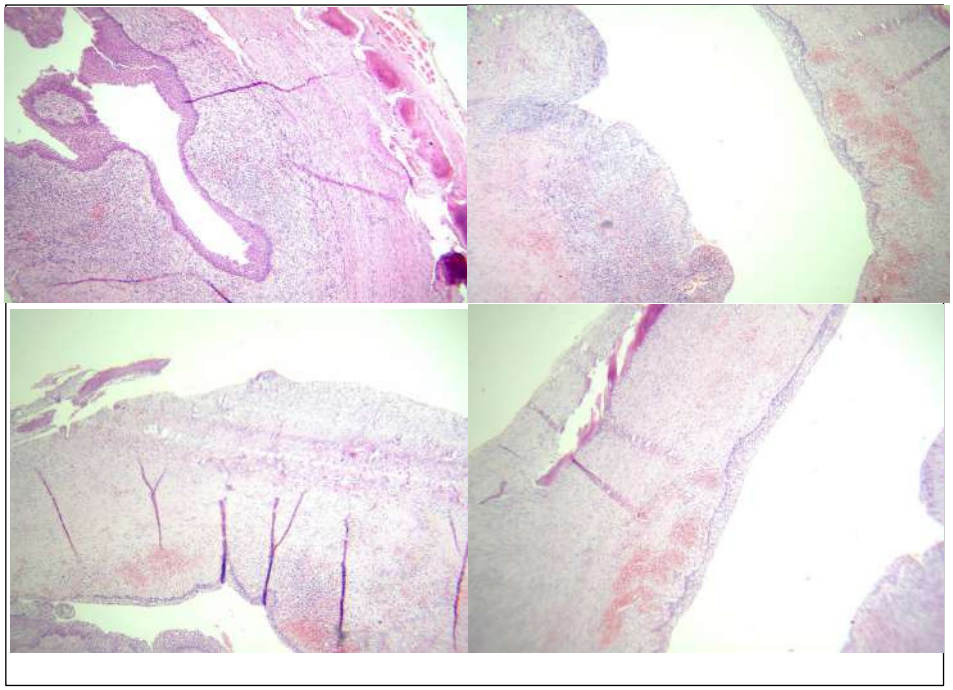

Figure 5. Photomicrograph of the histopathological specimen (Hematoxylin and Eosin stain, 100x). The cyst is lined by non-keratinized stratified squamous epithelium (black arrow). The underlying connective tissue capsule shows a dense, diffuse infiltrate of chronic inflammatory cells, predominantly lymphocytes and plasma cells (white arrow). A cholesterol cleft is also visible (asterisk).

2.5 Follow-up and Outcome:

The postoperative course was uneventful, with minimal swelling and discomfort. Sutures were removed after one week. The patient reported high satisfaction with the outcome. Clinical and radiographic follow-up at 3 and 6 months showed excellent healing of the surgical site with bone fill evident on radiographs and no signs of recurrence. The patient is scheduled for annual reviews to ensure long-term stability.

Discussion

Radicular cysts represent the endpoint of a chronic inflammatory process initiated by pulpal necrosis.[4,10] The pathogenesis involves the stimulation and proliferation of epithelial rests of Malassez within a periapical granuloma by inflammatory mediators, leading to central liquefaction necrosis and cyst formation.[11] The case presented is notable for the considerable size of the cyst despite the patient's young age and the absence of pain. This extensive growth over six months can be attributed to several factors: the persistent low-grade infection from the necrotic pulps, the lack of early definitive intervention (with treatment limited to repeated antibiotic courses), and possibly the patient's smoking status, which is known to impair immune response and wound healing, potentially allowing for unchecked progression.[12]

The clinical presentation was classic for a large radicular cyst: a painless, fluctuant swelling associated with non-vital teeth. The diagnostic cornerstone in this case was advanced imaging. While the panoramic radiograph suggested the lesion's size, CBCT was invaluable in providing a precise three-dimensional roadmap.[8,9] It accurately delineated the palatal bone destruction, confirmed the integrity of the buccal cortex and nasal floor, and ruled out sinus involvement. This information was critical for planning a conservative surgical approach that ensured complete removal while minimizing morbidity.

The histopathological findings were characteristic and confirmed the clinical-radiographic diagnosis. The lining of non-keratinized stratified squamous epithelium, often with arcading patterns, and the intensely inflamed fibrous capsule are hallmarks of radicular cysts.[2,13] The presence of cholesterol clefts, as seen in this case, is a common feature resulting from the breakdown of erythrocyte membranes and is often associated with a foreign body giant cell reaction.[14]

The management adhered to contemporary principles for large cystic lesions involving teeth. Preserving the involved teeth is a primary goal when possible.[15] Therefore, endodontic therapy was completed prior to surgery to eliminate the source of infection and improve the prognosis of the teeth. Surgical enucleation was

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chosen over marsupialization due to the well-defined, accessible nature of the cyst and the desire for a definitive, single-stage procedure with a complete histopathological specimen. The combined approach successfully eradicated the disease process while maintaining dental arch continuity and function.

This case aligns with literature emphasizing the shift from radical excision to tooth-preserving, conservative management for benign odontogenic pathologies.[16,17] It also highlights a potential gap in primary dental care, where symptomatic periapical pathology may be managed with antibiotics alone, delaying definitive treatment and allowing for significant disease progression.

Conclusion

This report illustrates that radicular cysts, though common, can present as extensive, destructive lesions even in young adults without dramatic symptoms. It underscores the paramount importance of a timely and accurate diagnosis utilizing three-dimensional imaging like CBCT. A meticulously planned, interdisciplinary approach combining endodontic therapy and surgical enucleation offers an excellent prognosis, preserving form and function. Histopathological examination remains the definitive diagnostic tool. The successful outcome in this case reinforces the efficacy of contemporary, conservative maxillofacial surgical principles in managing extensive odontogenic cystic disease.

Patient Consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Figure Legends

Figure 1. Preoperative intraoral occlusal view showing the dome-shaped, fluctuant palatal swelling extending from tooth #22 to #25.

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