

MANAGEMENT OF AN EXTENSIVELY SPREADING RADICULAR CYST OF THE MANDIBLE RADIOGRAPHICALLY MIMICKING AN ODONTOGENIC KERATOCYST: A CASE REPORT

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ABSTRACT:

Radicular cysts are the most common inflammatory odontogenic cysts of the jaws, typically presenting as localized periapical radiolucencies associated with non-vital teeth. While their expansion usually occurs in a buccolingual direction, atypical horizontal/transverse mesiodistal expansion mimicking multilocular or extensive lesions like Odontogenic Keratocysts (OKCs) presents a diagnostic challenge. This case report describes a 48-year-old female presenting with pain and mild chin swelling caused by a large, well-defined radicular cyst extending from the left mandibular second premolar (35) across the midline to the right mandibular canine (43), associated with apical root resorption of involved teeth. The lesion originated from a non-vital, non-RCT treated tooth (35) beneath a PFM crown. Management involved endodontic therapy of teeth 35 to 42, surgical enucleation via a buccal window osteotomy, histopathological confirmation, and subsequent fixed prosthetic rehabilitation with a mandibular PFM bridge with bilateral distal extensions following the patient's refusal of implant and precision attachment options.

KEYWORDS: Radicular cyst, Periapical cyst, Odontogenic cyst, Endodontic-surgical management, Mesiodistal expansion, Apical root resorption, Case report.

INTRODUCTION:

Radicular cysts account for approximately 52% to 68% of all odontogenic cysts affecting the human jaws.⁽¹⁾ They arise from the epithelial rests of Malassez within the periodontal ligament secondary to pulpal necrosis triggered by dental caries, trauma, or inadequate endodontic procedures.⁽²⁾ Pathogenically, persistent periapical inflammation induces the release of pro-inflammatory cytokines (such as IL-1, IL-6, and TNF alpha), driving epithelial proliferation and fluid accumulation driven by osmotic pressure.⁽³⁾

Typically, radicular cysts expand slowly in a round-to-oval, concentric manner, often breaching or expanding the cortical plates in a buccolingual direction.⁽⁴⁾ In contrast, conditions such as Odontogenic Keratocysts (OKCs) characteristically exhibit an intramedullary growth pattern along the mesiodistal length of the jaw with minimal cortical expansion.⁽⁵⁾ When a radicular cyst exhibits an extensive transverse, mesiodistal expansion crossing the midline without significant cortical breach, it frequently leads to diagnostic ambiguity. This report details an unusual case of an extensive radicular cyst with a mesiodistal growth pattern resembling an OKC, its multidisciplinary endodontic-surgical management, and final prosthetic rehabilitation.

CASE PRESENTATION:

Patient Information & Chief Complaint:

A 48-year-old female presented to a private dental practice reporting pain in her mandibular anterior and left posterior regions, spanning from the left second premolar to the right canine region, accompanied by a mild swelling in the chin region for one week. She reported no history of trauma to the lower facial region.

Clinical Examination:

Intraoral examination revealed nine teeth present in the mandibular arch (35 to 44). A Porcelain-Fused-to-Metal (PFM) crown was present on tooth 35, which had been placed 4 to 5 years prior without prior root canal therapy (RCT). Tenderness on Percussion (TOP) was elicited from teeth 35, 34, 33, 32, 31, 41, 42, and 43, with the severity

being highest in tooth 35. Intraoral palpation revealed a very mild, firm, slightly tender swelling in the labial vestibule of the mandibular anterior region.

Diagnostic Assessment:

- **Radiographic Evaluation:** An initial intraoral periapical radiograph (RVG) of tooth 35 confirmed the absence of endodontic treatment, a widened periodontal ligament (PDL) space, and a well-defined periapical radiolucency whose anterior border extended beyond the image frame.
- **Orthopantomogram (OPG) Findings:** An OPG revealed a large, well-circumscribed, unilocular radiolucency with a thin sclerotic margin extending mesiodistally from the apical area of tooth 35 across the midline to the mesial/apical region of tooth 43. External apical root resorption was clearly discernible on teeth 32, 31, 41, and 42 due to chronic pressure from the cystic fluid. Multiple long-span PFM fixed prostheses were also noted in the maxillary arch.

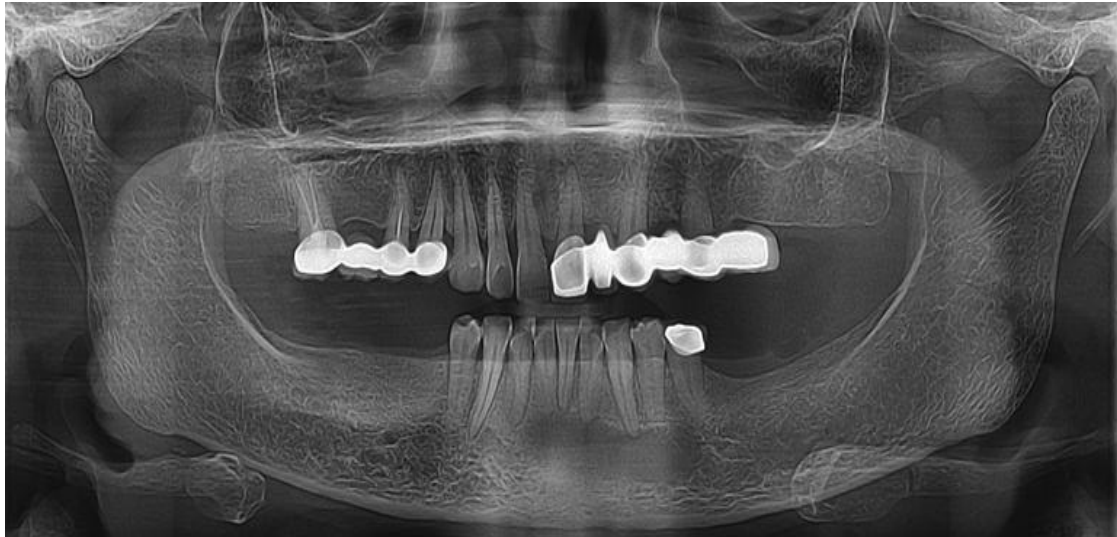


Figure 1 shows the Radiograph – Orthopantomography

HISTOPATHOLOGICAL FEATURES:

The given H and E stained soft tissue section shows inflamed connective tissue exhibiting diffuse dense aggregates of mixed inflammatory cell infiltrate, few cholesterol clefts and extravasated RBCs. Foci of non-keratinized stratified squamous cystic lining epithelium exhibiting arcading pattern is evident.

IMPRESSION:

Clinico-pathological correlation suggestive of **Radicular Cyst**.

Figure 2 shows the Histopathological report of the case

CHRONOLOGICAL TIMELINE

- Initial Presentation: Pain, mild chin swelling; OPG reveals radiolucency (35 to 43) with associated apical root resorption of anterior teeth.
- Phase 1 (Endodontics): Crown sectioned (35); RCT initiated (35-42); pus drained.
- Phase 2 (Medication): 5-day course: Amoxicillin+Clavulanate, Metronidazole, Aceclofenac + Paracetamol, Pantoprazole.
- Phase 3 (Review 1-3): Debridement, Calcium Hydroxide medicament, Bioceramic obturation.
- Phase 4 (Surgery): High vestibular incision, buccal window, enucleation in toto.
- Phase 5 (Histology): Confirmed Radicular Cyst.
- Phase 6 (Complication): Recurrent pain in 35; patient chose extraction over apicectomy.
- Phase 7 (Prosthetics): Final PFM bridge (36 to 46 with bilateral distal extensions).

Therapeutic Interventions:

1. Phase 1: Initial Endodontic Phase

- The PFM crown on 35 was sectioned and removed.
- Endodontic access cavities were prepared under local anaesthesia for teeth 35, 34, 33, 32, 31, 41, and 42. Non-vitality was confirmed across teeth 35 to 31.
- Active purulent drainage was noted upon access: extensive in 33 and 32, moderate in 34, and mild in 35.
- Teeth were left open for drainage, and systemic medical therapy was initiated for 5 days:
 - Amoxicillin 500 mg + Clavulanic Acid 125 mg (TDS)
 - Metronidazole 400 mg (TDS)
 - Aceclofenac 100 mg + Paracetamol 325 mg (BD)
 - Pantoprazole 40 mg (OD)

2. Phase 2: Sequential Review & Intra-canal Medicaments

- Review 1 (48 Hours Post-op): Active pus discharge persisted in 32, 33, and 34; intracanal irrigation was performed and left open. Teeth 35 and 31 showed no discharge; calcium hydroxide $\text{Ca}_2(\text{OH})$ intra-canal medicament was placed, and temporary dressings were applied to 42, 41, 31, and 35.
- Review 2 (48 Hours later): Complete cessation of active discharge across all canals. $\text{Ca}_2(\text{OH})$ intra-canal medicament was placed in all remaining canals with temporary restoration.
- Review 3 (1 Week later): Biomechanical preparation (BMP) was finalized. All seven teeth (35-42) were obturated using gutta-percha with a bioceramic sealer, followed by glass ionomer cement (GIC) for coronal entrance restoration.

3. Phase 3: Surgical Cyst Enucleation

- Under local anaesthesia, a high vestibular incision was made from 41 to 35, and a full-thickness mucoperiosteal flap was elevated.
- Cortical bone evaluation revealed an intact labial plate with no bone breach. A buccal bone window was created in the 34-32 region using a rotary micromotor bur under continuous saline irrigation.
- Complete curettage and enucleation of the lesion *in toto* was executed using surgical bone curettes. The tissue specimen was immediately fixed in 10% neutral buffered formalin and sent for histopathological examination.
- Primary closure was achieved using 4.0 silk sutures with simple interrupted technique.

POST-OPERATIVE FOLLOW-UP TIMELINE

48 Hours Post-Op: Mild swelling, hematoma, and bruising present in chin region.

Day 5 Post-Op: Wound gapping noted; snapped sutures removed; saline/betadine lavage.

Day 10 Post-Op: Healing satisfactory; remaining sutures removed.

Day 15 Post-Op: Complete secondary intention healing of gapped mucosal areas.

4. Phase 4: Histopathology & Complication Management

- **Histopathological Result:** Microscopic analysis confirmed a **Radicular Cyst**, characterized by a non-keratinized stratified squamous epithelial lining displaying an arcading pattern, supported by a fibrous connective tissue capsule containing intense chronic mixed inflammatory cell infiltrate, cholesterol clefts, and extravasated RBCs.
- **Complication at Tooth 35:** At the 3-week follow-up, the patient presented with recurrent localized pain and TOP in tooth 35. RVG verified intact, high-quality obturation terminating precisely at the anatomical apex.
- Retreatment was initiated on 35 (gutta-percha removal, $\text{Ca}_2(\text{OH})$ medicament, 1-week antibiotic coverage). Symptoms temporarily abated, and re-obturation was performed.
- One week post re-obturation, the patient experienced recurrent sharp pain in 35. Periapical surgery (apicectomy/retrograde filling) was recommended, but the patient refused further conservative efforts and requested extraction. Surgical extraction of 35 was performed uneventfully under local anaesthesia.

5. Phase 5: Prosthetic Rehabilitation

- Treatment options presented included:
 - Option A: Dual dental implants in posterior regions. (*Denied*)
 - Option B: Precision attachment-retained removable/fixed partial denture. (*Denied*)
 - Option C: Fixed PFM Bridge spanning 36 to 46 with bilateral two-unit distal pontic extensions. (*Accepted*)
- One month post-extraction, a full-arch PFM bridge spanning from 36 to 46 with bilateral 2-teeth distal extensions was cemented. At follow-up, the patient demonstrated satisfactory masticatory function, acceptable aesthetics, and complete radiographic resolution.

DISCUSSION

Radicular cysts typically expand uniformly in response to intra-cystic hydrostatic pressure generated by hyperosmolar fluid collection, leading to cortical expansion primarily in the direction of least resistance—most commonly the thinner labial/buccal plates.⁽⁶⁾ The striking feature of this case was the extensive mesiodistal (transverse) expansion of the lesion spanning from 35 to 43 across the midline without labial cortical perforation, accompanied by noticeable apical root resorption on teeth 32, 31, 41, and 42. This radiographic feature strongly mimicked an Odontogenic Keratocyst (OKC) or Ameloblastoma, which typically travel through the medullary spaces along paths of minimal resistance without causing early cortical expansion.⁽⁷⁾

The aetiology in this case can be traced to tooth 35, where a PFM crown was placed without prior endodontic therapy on a compromised pulp. Asymptomatic pulpal necrosis subsequently developed, establishing a chronic periapical lesion that coalesced and spread laterally through the trabecular spaces across the anterior mandible.⁽⁸⁾ The pressure generated by the expanding cystic fluid not only led to loss of vitality in adjacent teeth but also induced external root resorption of the anterior teeth within the lesion boundary.⁽⁹⁾

Surgical management via complete enucleation (*in toto*) combined with bioceramic obturation represents the gold standard for large inflammatory cysts to prevent recurrence.⁽¹⁰⁾ Bioceramic sealers offer superior biocompatibility, sealability, and osteogenic potential, which are essential when periapical tissues are significantly compromised⁽¹¹⁾. Despite successful root canal retreatment, persistent localized failure in tooth 35 necessitated extraction. Persistent post-treatment symptoms in teeth involved in large cyst cavities are often attributed to complex apical deltas, lateral canals, or extra-radicular infection not fully eradicated by conventional chemo-mechanical preparation.⁽¹²⁾ While dental implants or precision attachment prostheses represent ideal restorative options following extensive tooth loss or long-span edentulous spaces, patient autonomy and financial or personal preferences often dictate alternative options⁽¹³⁾. Although distal cantilever extensions carry an increased risk of biomechanical leverage forces on abutment teeth⁽¹⁴⁾, careful occlusal adjustment can provide a functional alternative when patients decline surgical implant placement or removable attachment options.

CONCLUSION

This case illustrates that radicular cysts can present with atypical transverse, mesiodistal expansion and root resorption mimicking aggressive developmental lesions like OKCs. Thorough clinical examination, pulp vitality testing, step-wise endodontic therapy, complete surgical enucleation, and flexible prosthetic treatment planning tailored to patient preferences are crucial for successful outcomes.

REFERENCES

1. Nair PN. Pathogenesis of apical periodontitis and the causes of mucosal failure after root canal treatment. *Crit Rev Oral Biol Med*. 2004;15(6):348-381.
2. Lin LM, Ricucci D, Lin J, Rosenberg PA. Nonsurgical root canal treatment of large cyst-like periapical lesions. *Dent Traumatol*. 2009;25(6):569-575.
3. Consolaro A. Inflammatory root resorption: basic aspects, classification, and clinical consequences. *Dental Press J Orthod*. 2012;17(2):20-25.
4. Neville BW, Damm DD, Allen CM, Chi AC. *Oral and Maxillofacial Pathology*. 4th ed. Elsevier; 2015:646-652.
5. Wright JM, Vered M. Update from the 4th Edition of the World Health Organization Classification of Head and Neck Tumours: Odontogenic and Maxillofacial Bone Tumors. *Head Neck Pathol*. 2017;11(1):68-77.
6. Schulz M, von See C, Al-Nawas B, Wagner W. Differential diagnosis and therapy of extensive cystic lesions of the jaws. *J Craniomaxillofac Surg*. 2011;39(6):442-447.
7. Bilodeau EA, Collins BM. Odontogenic Cysts and Neoplasms. *Surg Pathol Clin*. 2017;10(1):177-222.
8. Saunders WP, Saunders EM. Coronal leakage as a cause of endodontic failure. *Endod Dent Traumatol*. 1994;10(3):105-108.
9. Calışkan MK. Prognosis of large cyst-like periapical lesions following nonsurgical endodontic therapy: a clinical review. *Int Endod J*. 2004;37(12):841-849.
10. Riachi F, Tabarani C. Effective management of large radicular cysts using surgical enucleation and endodontic treatment: A case report. *Int J Dent Case Rep*. 2013;3(2):40-47.
11. Al-Haddad A, Che Ab Aziz ZA. Bioceramic-based root canal sealers: a review. *Int J Biomater*. 2016;2016:9753210.
12. Siqueira JF Jr, Rôças IN. Present status and future directions: Microbiology of endodontic infections. *Int Endod J*. 2022;55(Suppl 3):512-530.
13. Walton TR. An up to 15-year longitudinal study of 515 metal-ceramic fixed partial dentures: Part 1. Outcome. *Int J Prosthodont*. 2002;15(5):439-445.
14. Himmel R, Pilo R, Weiss EI, Levartovsky S. Removable partial dentures with precision attachments: A systematic review of long-term outcomes. *J Prosthet Dent*. 2014;112(5):1102-1108.