CASE REPORT

Infected Residual Cyst - Arising from the Roots : A Case Report

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Introduction

The periapical cyst (also termed radicular cyst, and to a lesser extent dental cyst) is the most common odontogenic cyst. It is caused by pulpal necrosis secondary to dental caries or trauma. The cyst lining is derived from the cell rests of Malassez. Usually, the periapical cyst is asymptomatic, but a secondary infection can cause pain. On radiographs, it appears a radiolucency (dark area) around the apex of a tooth’s root. Radicular cyst is the most common odontogenic cystic lesion of inflammatory origin. It is also known as periapical cyst, apical periodontal cyst, root end cyst or dental cyst. It arises from epithelial residues in periodontal ligament as a result of inflammation. The inflammation usually follows death of dental pulp. Radicular cysts are found at root apices of involved teeth. These cysts may persist even after extraction of offending tooth; such cysts are called residual cysts1,2.

Definition

- A cyst is an epithelial lined, pathological cavity having fluid, semi-fluid or gaseous contents and surrounded by connective tissue.
- ARadicular Cystis defined as an odontogenic cyst of inflammatory origin that is preceded by a chronic periapical granuloma and stimulation of cell rests of Malassez present in the periodontal membrane.

Classification

- Periapical Cyst: These are the radicular cysts which are present at root apex.
- Lateral Radicular Cyst:- These are the radicular cysts which are present at the opening of lateral accessory root canals of offending tooth.

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Residual Cyst:

These are the radicular cysts which remains even after extraction of offending tooth.

Causes

Dental cysts are usually caused due to root infection involving the tooth affected greatly by carious decay. The resulting pulpal necrosis causes release of toxins at the apex of the tooth leading to periapical inflammation. This inflammation leads to the formation of reactive inflammatory (scar) tissue called periapical granuloma further necrosis and damage stimulates the Malassez epithelial rests, which are found in the periodontal ligament, resulting in the formation of a cyst that may be infected or sterile (The epithelium undergoes necrosis and the granuloma becomes a cyst). These lesions can grow into large lesions because they apply pressure over the bone causing resorption. The toxins released by the breakdown of granulation tissue is one of the common causes of bone resorption. These cysts are not true neoplasms.

Etiology

A Radicular Cyst presupposes physical, chemical or bacterial injury resulting in death of pulp followed by stimulation of epithelial cell rests of malassez which are present normally in periodontal ligament.

Pathogenesis

Pathogenesis of Radicular Cyst is conveniently considered in 3 Phases, which are as follows:

Phase of Initiation

It is generally agreed that the epithelial lining of these cysts are derived from epithelial cell rests of malassez in periodontal ligaments. However in some cases, epithelial lining may be derived from:

- Respiratory epithelium of Maxillary sinus when periapical lesion communicates with sinus wall.
- Oral epithelium from fistulous tract.

Phase of Cyst Enlargement

Experimental work provided evidence that osmosis makes contribution to increase in size of cyst. Investigators found that fluids of Radicular cysts have Gamma Globulin level High by almost more than half to patient’s own serum. Plasma protein exudate & Hyaluronic acid as well as
products of cell breakdown contribute to high osmotic pressure of cystic fluid on cyst walls which causes resorption of bone and enlargement of cyst.

Microbiology

Cyst may or may not be infected. In infection, Actinomyces organisms have been isolated from radicular cyst. Microorganisms mainly found in root canal are 75% Gram +ve & 24% Gram -ve, among which Streptococci are predominant. Gram +ve organisms like Staphylococci, Corynbacterium, yeast and others are also found. Gram -ve organisms are Spirochetes, Nesseria, Bacteroids, fusobacterium, pseudomonas and others. In Periapical lesions like Radicular cysts Obligate anaerobes are found. Additionally in long-standing cases of periapical pathology a-hemolytic and non-hemolytic streptococci are found along with obligate anaerobes. Medias used for Culture of Root Canal Materials are- Brain Heart Infusion Broath with 0.1% Agar, Trylicase Soy Broath with 0.1% Agar (TSA), Glucose Ascitis Broath (GAB).

Clinical Features

Expansion of the cyst causes erosion of the floor of the maxillary sinus. As soon as it enters the maxillary antrum the expansion starts to occur a little faster because there is space available for expansion. Tapping the affected teeth will cause shooting pain. This is virtually diagnostic of pulpal infection.

- Frequency:- It is most common cystic lesion of jaw comprising approximately 52.3% of jaw cystic lesions
- Age:- Large no. of cases are found in 4th & 5th decades of life after which there is gradual decline.
- Sex:- It is more common in males comprising about 58% & in females comprising about 42%.
- Race:- White patients are involved with a frequency of about twice that of Black patients.

- Site:- It occurs with frequency of 60% in Maxilla. Though it may occur in all tooth bearing areas of both the jaws but preferably it occurs in maxillary anterior region. Upper lateral Incisors and dens in dente are usually the offending teeth. It occurs most commonly at apices of involved teeth. They may however be found at lateral accessory root canals.

Gross Features

Gross Specimen may be spheroidal or ovoid intact cystic masses, but often they are irregular and collapsed. The walls vary from extremely thin to a thickness of about 5mm. The inner surface may be smooth or corrugated yellow mural nodules of cholesterol may project into the cavity. The fluid contents are usually brown from breakdown of blood and when cholesterol crystals are present they impart an orange gold or straw colour.

Clinical Presentation

Smaller radicular cysts are usually symptomless and may be discovered when intraoral periapical (IOPA) radiographs are taken of non-vital teeth. Larger lesions show slowly enlarging swelling. At first the enlargement is bony hard but as cyst increases in size, the covering bone becomes very thin, despite subperiosteal deposition and swelling exhibits springiness, only when cyst has become completely eroded, the bone will show fluctuation. In Maxilla, there may be buccal and palatal enlargement Whereas in mandible it is usually labial or buccal and only rarely lingual. Pain & infection are other clinical features of some radicular cysts. These cysts are painless unless infected. However, complain of pain is also observed in patient without any evidence of infection. Occasionally, a sinus may lead from cyst cavity to the oral mucosa. Quite often, there may be more than one radicular cyst. Scientists believe that there are cyst prone individuals who show particular susceptibility to develop radicular
cysts. Radicular cysts arising from deciduous tooth are very rare. Deciduous tooth which had been treated endodontically with materials containing Formecresol which in combination with tissue protein is antigenic and may elicit a humoral or cell-mediated response like rapid buccal expansion of cyst. Rarely, parasthesia or pathologic jaw bone fracture may occur.

Radiographically\textsuperscript{15,17}, it is virtually impossible to differentiate granuloma from a cyst. If the lesion is large it is more likely to be a cyst. Here, both granuloma and cyst appear radiolucent, associated with the apex of non vital tooth. Intraoral Periapical radiographs i.e. IOPAs are common radiographs which are used as diagnostic aid from radiological point of view. Radiographically it features as round or ovoid radiolucent areas surrounded by a narrow radiopaque margin, which extends from Lamina Dura of involved tooth. In infected or rapidly enlarging cysts, radio-opaque margins may not be seen. Root resorption is rare but may occur. Radiologic presentation of Radicular Cyst\textsuperscript{20,21} is given in detail as follows:

- **Periphery & Shape** - Periphery usually have a well defined cortical border. If Cyst is secondarily infected, the inflammatory reaction of surrounding bone may result in loss of this cortex or alteration of cortex into more sclerotic border. The outline of radicular cyst usually is curved or circular unless it is influenced by surrounding structures such as cortical boundaries.
- **Internal structure** - in most cases, internal structure of radicular cyst is radiolucent. Occasionally, dystrophic calcification may develop in long standing cysts appearing as sparsely distributed, small particulate radio-opacities.
- **Effects on surrounding structures** - If a radicular cyst is large, displacement and resorption of roots of adjacent teeth may occur. The resorption pattern may have a curved outline. In rare cases, the cyst may resorb the roots of related non-vital teeth. The cyst may invaginate the antrum, but there should be evidence of a cortical boundary between contents of cyst and internal structure of antrum. The outer cortical plates of maxilla and mandible may expand in a curved or circular shape. Cyst may displace the mandibular alveolar nerve canal in an inferior direction.

**Histopathological Features**\textsuperscript{7,14} - The gross specimen may be spherical or ovoid intact cystic masses, but often they are irregular and collapsed. The walls vary from extremely thin to a thickness of about 5mm. The inner surface may be smooth or corrugated. The histopathological studies shows following features:

- **Epithelial Lining**: Almost all radicular cysts are wholly or in part lined by stratified Squamous Epithelium & range in thickness from 1 to 50 cell layers. The only exception to this is in those rare cases of periapical lesions of Maxillary Sinus. In such cases, cyst is then lined with a pseudo stratified ciliated columnar epithelium or respiratory type of epithelium. Ortho or para keratinised linings are very rarely seen in radicular cysts. Secretory cells or ciliated cells are frequently found in epithelial lining.
- **Rushton’s Hyaline Bodies**: In approximately 10% of cases of radicular cysts, Rushton’s Hyaline bodies are found in epithelial linings. Very rarely they are found in Fibrous capsule. The hyaline bodies are tiny linear or arc shaped bodies which are amorphous in structure, eosinophilic in reaction and Brittle in nature.
- **Cholesterol Clefts**: Deposition of Cholesterol crystals are found in many radicular cysts, slow but considerable amount of cholesterol accumulation could occur through degeneration and disintegration of lymphocytes, plasma cells and macrophages
taking part in inflammatory process, with consequent release of Cholesterol from their walls.

- **Fibrous Capsule:** Fibrous Capsule of Radicular Cyst is composed of mainly condensed parallel bundles of collagen fibres peripherally and a loose connective tissue adjacent to epithelial lining.

- **Inflammatory Cells:** Acute inflammatory cells are present when epithelium is proliferating. Chronic inflammatory cells are present in connective tissue immediately adjacent to epithelium.

- **Mast cells, Remnants of Odontogenic Epithelium & occasionally Satellite microcysts are also present.** Some cysts are markedly vascularised. Various kinds of Calcifications are also present.

**Differential Diagnosis**

Radicular Cyst/Periapical Granuloma/ Traumatic Bone Cyst/Periapical Scar/Periapical Cemental Dysplasia/Periapical Surgical Defect/ Globulomaxillary Cyst/Pumice Cyst/Aneurysmal Bone Cyst/Mandibular Infected Buccal Cyst/ Periapical Cemento-osseous dysplasia.

**Treatment**

The source (i.e., necrotic pulp) should be removed by full pulpectomy (i.e., root canal therapy) or extraction of the offended tooth, and the cyst should be enucleated.

**Endodontic Treatment**

Peripheral lesions including radicular cysts are eliminated by body once the causative agents are removed. Majority of radicular cysts can undergo resolutions following Root Canal Treatment & don’t require surgical intervention. It is suggested that insertion of file or other root canal instrument beyond the apical foramen (for 1–2mm) produces transitory acute inflammation which may destroy epithelial lining of radicular cyst and convert it into granuloma, leading to its resolutions.

**Surgical Treatment**

- **Enucleation:** The affected tooth is extracted or preserved by root canal treatment with apicocetomy. A mucoperiosteal flap over cyst is raised and a window is opened in the bone to give adequate access. The cyst is carefully separated from its bony wall. The entire cyst is removed intact. the edges of bony cavity are smoothened off, free bleeding is controlled and cavity is irrigated to remove debris. Mucoperiosteal flap is replaced back and sutured in place.

- **Marsupialisation:** The cyst is opened essentially as for enucleation but the epithelial lining is sutured to mucous membrane at margins of opening. The aim is to produce a self-cleansing cavity, which becomes an invagination of oral tissues. The cavity is initially packed with ribbon gauze and after margins are healed a plug or extension of denture is made to close the openings. The cavity usually closes by regrowth of surrounding tissues and restoration of normal contour of that part. However, there are always chances of closing the orifice and reformation of cyst. The main application is for temporary decompression of exceptionally large cyst where fracture of jaw is a risk factor. When enough new bone is formed, cyst can be enucleated.

**Prognosis**

Prognosis depends on particular tooth, the extent of bone destroyed and accessibility for treatment.

**Expected Complications**

- **Carcinomatous/Neoplastic Changes:** Squamous Cell Carcinoma or Epidermoid Carcinoma may occasionally arise from epithelial lining of Radicular Cyst.
- Pathologic Jaw Fracture - If Cyst has completely eroded the bone specially if it is present in posterior region which is very rare in case of Radicular Cyst it may cause pathologic jaw bone fracture.
- Secondary Infection - Cyst may get secondarily infected and create further complications.

Case Report

A 56 year old male patient reported to the department of oral medicine and radiology with the chief complaint of pain and swelling in the right lower posterior region of face from past one week, which is severe and continuous in nature, had taken medicine for the same but got mild relief (Fig.1). History of recurrent swelling since past six months. He underwent extraction irt 45,46 one month back but got no relief and the swelling re-occurred 3-4 days after extraction and has increased gradually since then to its present size. No contributory medical and dental history was revealed. Patient gave a personal history of smoking one bundle bidi/day since 35 years regarding oral habits. On Extraoral Examination submandibular lymphnodes were firm, palpable and tender on right side. On clinical examination, there is a solitary, localized swelling with well-defined margins of 3x3 cm in size extending anterio-posteriorly, from the corner of the mouth to 1 cm anterior from the angle of the mandible and superior-inferiorly, 1cm below the ala-tragus line to the lower border of mandible. Color of the overlying skin is slightly red. On palpation, swelling is firm, tender and warm (Fig.2). On intraoral examination swelling is present in the region of right lower buccal vestibule irt 47, 48 with obliteration of buccal vestibule along with pus discharge. Hard tissue examination shows - (Fig.3 &4)

![Fig. 1](image1)

![Fig. 3](image3)

![Fig. 4](image4)

- Missing irt 18,17,21,22,24,11,45,46,31.
- Mobility grade 1 irt 16,23.
- Grade 2 irt 32,42.
- Grade 3 irt 41,47.
- Generalized attrition.
- Furcation involvement irt 16,26,27,28,36, 37,38,47.

On the basis of history and clinical findings, a provisional diagnosis of Dento-alveolar abscess was made. Differential Diagnosis of Infected Residual Cyst arrived at 8, 9.

Radiological investigations advised were Panoramic view, PA view mandible, Occlusal and Intraoral-periapical radiograph irt 47,48. Radiographic interpretation shows a well-defined radiolucency with sclerotic borders showing anterio-posterior extension irt 44,47 (Fig.5,6&7).

![Fig. 5](image5)

![Fig. 6](image6)
Radiographically, d/d (1) Benign Odontogenic Tumour (unicystic ameloblastoma), (2) CEOT.

Specific Investigations: Aspiration of cystic fluid was done and revealed straw colored fluid.

Treatment plan: Extraction of 47 followed by Curettage with Marsupilization followed by histopathological examination and Betadine dressing placed in the cavity.

Histo-pathalogic report shows a cystic lumen lined by inflamed connective tissue capsule with traces of epithelium which confirms the diagnosis as to be an Infected Residual Cyst. Patient recalled after 7 days. On second visit Iodoform dressing placed in the cavity patient recalled every week to change the dressing for 2 months. Swelling subsided completely on fourth visit.

References
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