



## MICROFLORA ASSOCIATED WITH RADICULAR CYST – REVIEW ARTICLE

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**ABSTRACT** Radicular cysts are the most common of all jaw cysts and comprise about 52% to 68% of all the cysts affecting the human jaws. Radicular cysts arise from the epithelial residues in the periodontal ligament as a result of inflammation. They generally result due to pulpal infection following dental caries. The objective of this review is to highlight the pathogenesis to understand between the two distinct categories of periapical cysts, namely, those containing cavities completely enclosed in epithelial lining, and those containing epithelium-lined cavities that are open to the root canals (bay cysts) and microflora associated with it.

### KEYWORDS :

#### INTRODUCTION

Radicular cysts are the most common cystic lesions affecting the jaws. They are most commonly found at the apices of the involved teeth, however they may also be found on the lateral aspects of the roots in relation to lateral accessory root canals. Quite often a radicular cyst remains behind in the jaws after removal of the offending tooth and this is referred to as a residual cyst<sup>1,2,3</sup>.

#### Development

Radicular cysts arise from the epithelial residues in the periodontal ligament as a result of inflammation. They generally result due to pulpal infection following dental caries. Bacteria from the gingival sulci or periodontal pockets have been suggested to reach the root canals of these teeth through severed periodontal blood vessels<sup>4</sup>. Pulpal infection can also occur through exposed dentinal tubules at the cervical root surface, due to gaps in the cemental coating<sup>5</sup>. Microbes have also been claimed to 'seed' in the necrotic pulp via the blood circulation (anachoresis)<sup>6</sup>. Initially, the tooth pulp becomes infected and necrotic by an autogenous oral microflora. The endodontic environment provides a selective habitat for the establishment of a mixed, predominantly anaerobic, flora.

Collectively, this habitat-adapted polymicrobial community residing in the root canal has several biological and pathogenic properties, such as antigenicity, mitogenic activity, chemotaxis, enzymatic histolysis, and activation of host cells. The microbial invaders in the root canal can advance, or their products can egress, into the periapex.. The microbial factors and host defense forces encounter, clash with, and destroy much of the periapical tissue, resulting in the formation of various categories of apical periodontitis lesions (5). Periapical cysts are a direct sequel to chronic apical periodontitis, but not every chronic lesion develops into a cyst. There are two distinct categories of periapical cysts, namely, those containing cavities completely enclosed in epithelial lining, and those containing epithelium-lined cavities that are open to the root canals. The latter was originally described as 'bay cysts' and has been newly designated as 'periapical pocket cysts'. More than half of the cystic lesions are true apical cysts, and the remainder are apical pocket cysts.

#### Pathogenesis of true cyst-

The periapical true cyst may be defined as a chronic inflammatory lesion at the periapex that contains an epithelium-lined, closed pathological cavity.

The '*nutritional deficiency theory*' is based on the assumption that the central cells of the epithelial strands become removed from their source of nutrition and undergo necrosis and liquefactive degeneration, the accumulating products in turn attract neutrophilic granulocytes into the necrotic area. Such microcavities containing degenerating epithelial cells, infiltrating mobile cells and tissue fluid

coalesce to form the cyst cavity lined by stratified epithelium. The '*abscess theory*' postulates that the proliferating epithelium lines an abscess cavity formed by tissue necrosis and lysis because of the innate nature of the epithelial cells to cover exposed connective tissue surfaces. During the third phase the cyst grows, but whose exact mechanism is still unknown. It is generally believed to be by osmosis. The presence of necrotic tissue in the cyst lumen attracts neutrophilic granulocytes, which extravasate and transmigrate through the epithelial lining into the cyst cavity where they perish.

#### Pathogenesis of pocket cysts:

The periapical pocket cyst contains an epithelium-lined pathological cavity that is open to the root canal of the affected tooth. As mentioned previously, such lesions were originally described as 'bay cysts'. It has been postulated that biologically, a pocket cyst constitutes an extension of the infected root canal space into the periapex. The microluminal space becomes enclosed in a stratified squamous epithelium that grows and forms an epithelial collar around the root tip. The epithelial collar forms an 'epithelial attachment' to the root surface so as to seal off the infected root canal and the micro-cystic lumen from the periapical milieu and the rest of the body. The presence of microorganisms at the apical foramen attracts neutrophilic granulocytes by chemotaxis into the microlumen.

These cysts can occur in the periapical area of any teeth, at any age but are seldom seen associated with the primary dentition.

#### Clinical Features-

Most of the radicular cysts are symptomless and are discovered when periapical radiographs are taken of teeth with non-vital pulps. Patient often complains of slowly enlarging swellings. At first the enlargement is bony hard but as the cyst increases in size, the covering bone becomes very thin despite subperiosteal bone deposition and the swelling then exhibits 'springiness'.

Only when the cyst has completely eroded the bone, there will be fluctuation. In the maxilla there may be buccal or palatal enlargement whereas in the mandible it is usually labial or buccal and only rarely lingual<sup>3</sup>. Pain and infection are other clinical features of some radicular cysts. It is often said that radicular cysts are painless unless infected. Some patients with these lesions, however, complain of pain although no evidence of infection is found clinically and no evidence of acute inflammation is seen histologically after the cyst has been removed. Likewise, some patients have clinically infected and histologically inflamed cysts which are not painful.

#### Microflora associated with radicular cyst-

The following are mostly associated radicular cyst ,obtained and isolated from cultures:

SMG(23.8%) [Streptococcus constellatus(19.1%) and Strepto-coccus

anginosus(4.7%), Streptococcus sanguis(14.3%), Streptococcus mitis(4.7%), Streptococcus cremoris(4.7%), Peptostreptococcus pevotii(4.7%),Prevotella buccae(4.7%), Prevotella intermedia(4.7%), Actinomyces meyeri(4.7%),Ac-tinomyces viscosus(4.7%), Propionibacterium propionicum(4.7%), Bacteroides capillosus(4.7%) , Staphylococcus hominis(4.7%), Rothia denticariosa(4.7%), Gemella haemolysans(4.7%), andFusobacterium nucleatum(4.7%).

12. Aguirrebengoa K, Romana M, Lopez L, Martin J, Montejo M, Gonzalez DeZarate P:[Oral and cervicofacial actinomycosis. Presentation of fivecases].Enfermedades infecciosas y microbiologia clinica2002;20(2):53–56.

### Microbial Diversity in Acute Apical Abscesses

Samples for microbiological analyses of abscesses can be taken either from the root canals of affected teeth or by aspiration of the purulent exudate from the swollen mucosa/skin. , the large majority of the frequently detected bacterial species belong to seven different bacterial phyla, namely, the *Firmicutes* (e.g., genera *Streptococcus*, *Dialister*, *Filifactor*, and *Pseudoramibacter*), *Bacteroidetes* (e.g., genera *Porphyromonas*, *Prevotella*, and *Tannerella*), *Fusobacteria* (e.g., genera *Fusobacterium* and *Leptotrichia*), *Actinobacteria* (e.g., genera *Actinomyces* and *Propionibacterium*), *Spirochaetes* (e.g., genus *Treponema*), *Synergistetes* (e.g., genus *Pyramidobacter* and some as-yet-uncultivated phylotypes), and *Proteobacteria* (e.g., genera *Campylobacter* and *Eikenella*)

### DISCUSSION

Radicular cysts arise from periapical granulomas formed on devital teeth. They are the most common lesions among tooth-originated periapical lesions, apartfrom periapical abscess and periapical granulomas . In addition, radicular cysts are the most commonamong all jaw cysts . Therefore, determination ofmicroorganisms associated with radicular cyst will en-sure more conscious treatment of infections that mightoccur in the jaw. Iatrou et al. isolated bacteria in 25patients (67.6%) of 37 patients who had been on antibioticmedication before collecting samples from infected jawcysts (1–6 days prior).<sup>78</sup>

SMG has also been reported to be significant pathogens . However, these pathogens are part of the normalflora of human oral cavity and other mucous mem-branes . SMG is not included in the approved listsof bacterial names, and is composed of three distinct species:Streptococcus anginosus,Streptococcus constellatus, andStreptococcus intermedius. SMG bacteria are important pathogenic microorganismsfor infections and abscess of the orofacial region, accordingto literature survey. In the present study, SMG (23.8%) andStreptococcus sanguis(14.28%) were predominantly isolatedfrom sample cultures.<sup>9</sup>

Actinomyces are Gram-positive, non-acid fast, an-aerobic or microaerophilic filamentous branched bac-teria that are very difficult to grow in culture. In man,Actinomyces. bacteria may cause severe head andneck infections. The pathogenicActinomycesmostfrequently isolated isActinomyces israelii.Actinomycespropionica,Actinomyces naeslundii,Actinomyces viscosus,andActinomyces odontolyticusare less common infec-tions.<sup>101112</sup>

### CONCLUSION-

It was observed that all isolated microorganismswere the types commonly foundin oral flora. Although nospecific microorganism was found, Streptococcus spp. bac-teria (47.5%)—especially SMG (23.8%)—were predomin-antly found in the microorganisms isolated. Furthermore,radicular cysts might be polymicrobial originated. Althoughradicular cyst is an inflammatory cyst, some radicular cystfluids might be sterile.

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