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RESEARCH ARTICLE

Inference the Microbial Infection and the Processing Methods of the Infected Dental Radicular Cysts in the High Altitude Area, Taif, KSA

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Abstract

This search was carried out to inference the microbial infection and the processing methods of the infected dental radicular cysts (RCs) in the high altitude area, Taif, KSA. Incidence of RCs-positive and RCs-negative from suspicious patients were resulted in (79.2 and 20.8%) respectively. Incidence of sterile and non-sterile from RCs-positive patient specimens were as (31.6 and 68.4%) for sterile and non-sterile respectively. Incidence of the mean microorganisms (MOs) types from non-sterile specimens were in the three types of MOs as (53.8, 43.1 and 3.1%) for (facultative anaerobes, anaerobes and fungi) respectively. All MOs were isolated often belonged to the high altitude area and normal ordinary oral cavity flora. Incidence of the mean cure by processing methods for patients, more cured patient were obviously in processing Group Control (GC), Group1 (G1) and Group2 (G2). GC was under treated by distilled water every other day, G1 was under treated by the Dentist prescribed antibiotics as a complete course, and G2 was under treated by Diode Laser sessions every other day. The cured were (20, 96.7 and 66.7%) for (GC, G1 and G2) respectively. G1 result was strongly indicated the successful treatment processing for RCs. The re-culture is also more in-need in the Micro. Lab., for the diagnosis of RCs fluid for the confirmation by the presence or absent of MOs and causing infections. On the fact the MOs cause RCs infection specially can survive in the high altitude and more of them were facultative anaerobes and anaerobes types.

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INTRODUCTION

RCs, call peri-apical, or peri-odontal cysts involving the apex of an erupted tooth. RC is an epithelium-lined sac at the apex of a tooth[1]. It's to a lesser extent dental cyst is the most common odontogenic cyst. Its caused by pulpal necrosis secondary to dental caries or trauma. Usually, RC is asymptomatic, but secondary MOs infection can cause pain. On radiographs, it appears a radiolucency (dark area) around the apex of a tooth's root. Sterile RC is the most common odontogenic cystic lesion of inflammatory origin. It arises from epithelial residues in peri-odontal ligament as a result of inflammation. The inflammation usually follows death of dental pulp. RCs are found at root apices of involved teeth. RCs might persists even after extraction of off-ending tooth. Whenever an infection was presented, MOs mainly found in root canal as 75% G-positive, 24% G-negative, yeast and others. In peri-apical lesions like RCs obligate anaerobes MOs were found[2]. RCs fluid samples were reported different MOs[3]. It consisted of 15% cysts, were occurred, showed the low incidence of RCs among peri-apical lesions as against the widely held view that almost half of all peri-apical lesions were cysts[4]. Many studies had performed to determine the relationship between the RCs, peri-apical lesions and MOs[5]. The most common were seen 50% of odontogenic cysts[6]. RCs were chronic inflammatory lesions and were considered to develop as a result of inflammation in peri-apical of tooth with pulp necrosis[7]. Intra-radicular biofilm arrangements were observed in the apical segment of 77% of the root

canals (untreated canals: 80%; treated canals: 74%). Bacterial biofilms were visualized in 62% and 82% of the root canals of teeth with small and large radiographic lesions. All canals with very large lesions harbored intra-radicular biofilms. The overall prevalence of biofilms in RC was 95%. The overall findings were consistent with acceptable criteria to include apical peri-odontitis in the set of biofilm-induced diseases. Biofilms were more likely to be present in associated with long-standing pathologic processes, including large lesions and cysts[8]. Infections were formed in peri-apical region as a result of odontogenic diseases, and unsuccessful dental treatments, can sometimes become serious intra-cranial infections and common head–neck infections[9]. Treatment of the RCs was use of antibiotics in sometimes considered to be supplementary, or to eliminate or limit the pathogenic MOs. Therefore, better knowledge of MOs will help improve the selection of antibiotics in oral. Fluid from RCs were showed a great variety of 42.3% anaerobic and 52.2% facultative anaerobic bacterial flora. It was observed that all isolated MOs were the types commonly found in oral flora. Furthermore, RCs might be poly-microbial originated. Although RCs were an inflammatory cysts, some RCs fluids might be sterile[10].

The aim: The aims of this paper research were divided into: The 1st aim was to investigate the sterility of RCs with the specimens obtained from RCs by Micro. Lab. techniques. The 2nd aim was to detect the predominant MOs associated with non-sterile RCs. The 3rd aim was to follow-up the processing methods of treatment for MOs infected the RCs.

Materials and Methods

- **Practical area and patients preparation:** Taif considered as a high altitude area, it was selected for the research study through the Private Dental Clinics. The aim of this work was explained to the Dental Clinic Owners, the Dentists (Dental Root Treatment Specialty), and the patients. Agreement papers were gotten from all of them, with a condition of do not remember any special or personal information, all information only for help this paper research. After the dental examination of total patients during 6month, it had resulted in gotten patients (No=120), they had from diagnosis a suspicious of RCs finding.
- **Processing methods explanation:** The all suspicious patients had divided into RCs-positive and RCs-negative according the confirmation by Dental Root Examination. So RCs-positive patients were divided into sterile and non-sterile RCs patients depending on the RCs aspirated fluid were tested for the presence of MOs. Non-sterile patients were going under processing methods for 5days. It were included: GC, G1 and G2. GC was under treated by distilled water every other day, G1 by the Dentist prescribed antibiotics as a complete course, and G2 by Diode Laser sessions every other day.
- **Specimens collection and transportation:** It was obtained RCs fluids from all patients who were diagnosed with suspicious of RCs presence, buccal mucosa was wiped with a sponge using an antiseptic solution povidene–Iodine 10% and then irrigated with 20ml sterile normal saline using a 10ml disposable sterile injector. Approximately (1-1.5ml) of RC fluid was aspirated with sterile needle for each pateint, the RCs fluids obtained were transported to Micro. Lab. within 20-40minutes. This mentioned steps were done for all RCs-positive patients and also were repeated for non-sterile patients after processing methods duration.
- **Specimens isolation and identification:** The specimens were cultured on 2blood agar were used to obtain aerobic, facultative anaerobic and anaerobic culture. Aerobic culture were incubated at 37°C for 24-48 hrs, and anaerobic culture were incubated at 37°C for 7days. The isolated MOs were stained with Gram's method, identified isolated MOs were by API 20 A panel (Bio-Meraux sa, France) and a computer system were used to identify the isolated bacteria, it were confirmed by Micro-scan device[11].
- **Phases of the case follow-up:**
 - Phase1:** Dental Clinic Examination and suspicious of RCs presence.
 - Phase2:** Specimens collection from RCs-positive and detection of MOs growth.
 - Phase3:** Identification of MOs were isolated.
 - Phase4:** The non-sterile patient were divided into 3groups (GC, G1 and G2).
 - Phase5:** Processing methods were started.
 - Phase6:** Specimens collection after processing methods finished.
- **Data Analysis:** The data were recorded and entered into Microsoft Excel Sheet, then were summarized and analyzed[12].

Results and discussion

Table and graph 1: Incidence of *RCs-positive and *RCs-negative from suspicious patients

Items	Total suspicious	*RCs- positive	*RCs- negative
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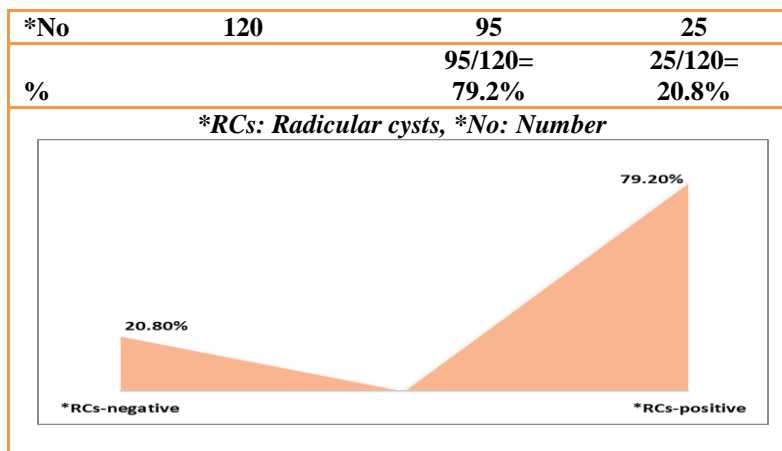


Table and graph 1 showed incidence of RCs-positive and RCs-negative from suspicious patients, it was totally 120 suspicious patients in the presence of RCs and from all were resulted in (79.2 and 20.8%) as (RCs-positive and RCs-negative) respectively. The RCs-positive were as 4times of RCs-negative, that revealed the present of RCs in high percentage with helping of high altitude circumstances to keep-up of RCs in very deep area of oral cavity.

Table and graph 2: Incidence of sterile and non-sterile from *RCs-positive patient specimens

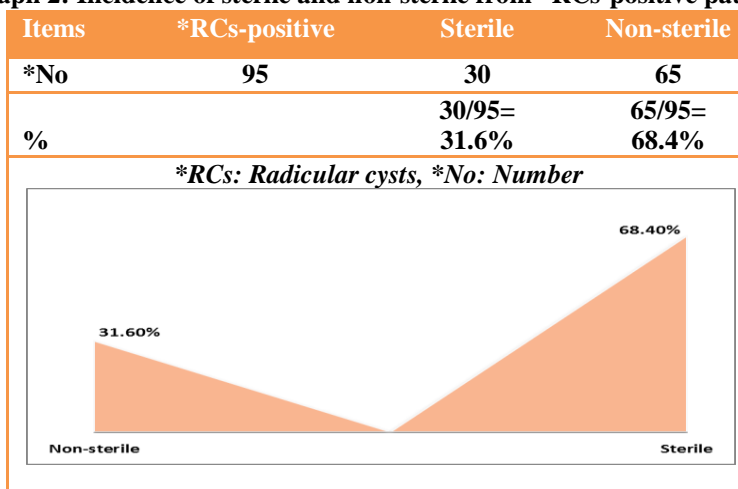


Table and graph 2 showed incidence of sterile and non-sterile from RCs-positive patient specimens, it was (sterile=no microbial growth) as 31.6% and (non-sterile=microbial growth) as 68.4% respectively. Non-sterile were in double compare to sterile specimens, as well as it was related to the present of MOs for long time in RCs. RC is to a lesser extent dental cyst is the most common odontogenic cyst. It is caused by pulpal necrosis secondary to dental caries or trauma. Usually, RC is asymptomatic, but a secondary infection can cause pain. Sterile RC is the most common odontogenic cystic lesion of inflammatory origin. The inflammation usually follows death of dental pulp. RCs were found at root apices of involved teeth. These cysts may persists even after extraction of offending tooth. RCs might or not be infected[2]. There were different MOs in cyst fluids[3]. The consisted of 15% cysts, were occurred, showed the low incidence of RCs among periapical lesions as against the widely held view that almost half of all periapical lesions were cysts[4]. The most common were seen RCs as 50%[6]. RCs were chronic inflammatory lesions and were considered to develop as a result of inflammation in periapical of tooth with pulp necrosis[7]. Over all, intra radicular biofilm arrangements were observed in the apical segment of 77% of the root canals. Bacterial biofilms were visualized in 62% and 82% of the root canals of teeth with small and large radiographic lesions, respectively. The overall prevalence of biofilms in RC was 95%. Biofilms were more likely to be present in associated with longstanding pathologic processes, including large lesions and cysts[8]. Infections were formed in periapical region as a result of odontogenic diseases, and unsuccessful dental treatments, can sometimes become serious intracranial infections and common head-neck infections[9]. Although RCs were an inflammatory cysts, some RCs fluids might be sterile[10].

Table and graph 3: Incidence of the mean *MOs types from non-sterile specimens

Items	Non-	Facultative	Anaerobes	Fungi
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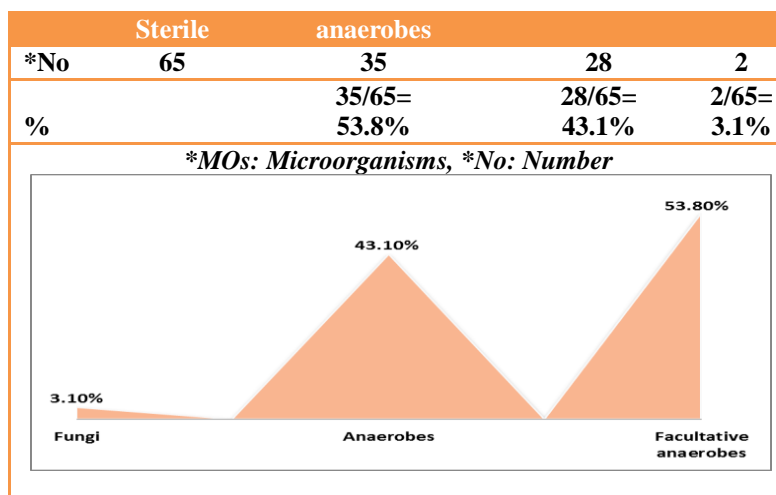


Table and graph 3 showed incidence of the mean MOs types from non-sterile specimens, it was in the three types of MOs as (53.8, 43.1 and 3.1%) for (facultative anaerobes, anaerobes and fungi) respectively. All MOs were isolated often belonged to the high altitude and normal ordinary oral cavity flora. The high MOs were facultative anaerobes so can live in presence or absent of oxygen, then followed by anaerobes was live without oxygen and the present of oxygen will kill it, and finally fungi were in very low percentage because it's in-need oxygen and the circumstances were not suitable for its growth. Whenever an infection is present in RCs, MOs mainly found in root canal as 75% G-positive, 24% G-negative, among which *Strept.* are predominant also other G-positive like *Staph.*, *Corynebacterium*, yeast and others are found. G-negative MOs were *Spirochetes*, *Neisseria*, *Bacteriodes*, *Fusobacterium*, *Pseudomonas* and others. In Periapical lesions like RCs obligate anaerobes are found. Additionally in long-standing cases of periapical pathology a haemolytic and non haemolytic *Strept.* were found along with obligate anaerobes[2]. Cyst fluid were reported different MOs[3]. The pocket cysts might heal after root canal therapy but the true cysts were less likely to be resolved by conventional root canal treatment[4]. The most common had seen odontogenic cysts were (approximately 50% of all odontogenic cysts)[6]. Over all, intra radicular biofilm arrangements were observed in the apical segment of 77% of the root canals (untreated canals: 80%; treated canals: 74%). Bacterial biofilms were visualized in 62% and 82% of the root canals of teeth with small and large radiographic lesions, respectively. All canals with very large lesions harbored intra-radicular biofilms. Biofilms were significantly associated with epithelialized lesions (RCs and epithelialized granulomas or abscesses). The overall prevalence of biofilms in RC was 95%. The overall findings were consistent with acceptable criteria to include apical periodontitis in the set of biofilm-induced diseases[8]. Infections were formed in periapical region as a result of odontogenic diseases, and unsuccessful dental treatments, can sometimes become serious intracranial infections and common head-neck infections[9]. MOs were isolated from cultures, demonstrated that RCs showed a great variety of 42.3% anaerobes and 52.2% facultative anaerobes bacterial flora. It was observed that all isolated MOs were the types commonly found in oral flora. Furthermore, RCs might be poly-microbial originated. Although RCs were an inflammatory cysts[10].

Table and graph 4: Incidence of the mean cure by processing methods for patients

Items	Duration	Processing methods		
		*GC Distilled Water	*G1 Antibiotics	*G2 Diode Laser
Treated *No	5days	5	30	30
Cured *No		1	29	20
%		1/5= 20%	29/30= 96.7%	20/30= 66.7%

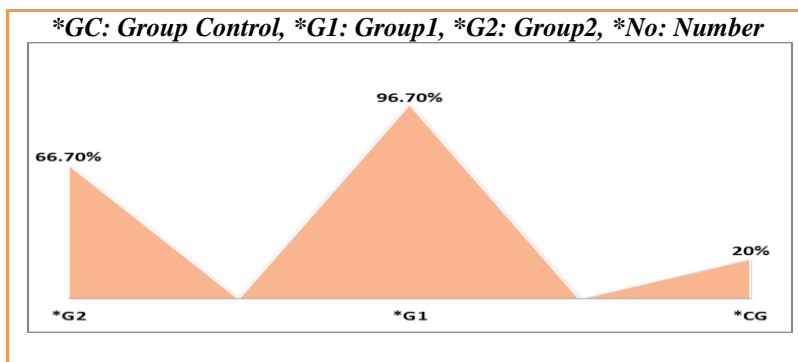


Table and graph 4 showed incidence of the mean cure by processing methods for patients, the re-culture for RCs fluid for MOs growth to detect the incidence of processing method in the treatment of MOs infection of RCs, non-growth were indicated the present of cure, any MOs growth indicated of non-cure even amount less than before processing methods revealed non-cure completely. More cured patient were obvious in processing with antibiotics as 96.7% in G1, that indicated it was successful processing. Then with Diode Laser processing as 66.7% in G2 were the deferent as 30% from antibiotics, that was clarify, RCs microbial infection is difficult to treatment except by a specific antibiotics but by Diode Laser was in-need more sessions for complete kill MOs and complete cure the patients. Finally with distilled water was 20% in CG as deferent from antibiotics by 77% and Diode Laser by 47%. Cure by distilled water, it was related to immune response of the patient or due to distilled water flashing and decreasing MOs nutrients so kill MOs but with a very low level. The re-culture is also in-need in Micro. Lab., for the diagnosis of RCs fluid to confirm the presence or absent of MOs. On the fact the MOs cause RCs infection specially can survive in the high altitude area and more are facultative anaerobes and anaerobes types. The pocket cysts might heal after root canal therapy but the true cysts were less likely to be resolved by conventional root canal treatment[4]. Treatment of the RCs was use of antibiotics was sometimes considered to be supplementary, or to eliminate or limit the MOs pathogenic. Therefore, better knowledge of MOs will be help improve the selection of antibiotics in oral[10].

Conclusions

The results of this research paper were demonstrated that MOs of RCs were showed a great variety of anaerobes, facultative anaerobes bacterial flora and fungi. All isolated MOs were the types commonly found in oral flora. Furthermore, RCs were an inflammatory cysts, some RCs fluid might be sterile. MOs cause RCs infection specially can survive in high altitude were like facultative anaerobes and anaerobes types. More cured patient were obviously in processing with antibiotics that indicated it was successful processing, then with Diode Laser processing, that was clarify, RCs microbial infection is difficult to treatment except by a specific antibiotics but by Diode Laser was in-need to more sessions for complete kill MOs and complete cure the patients.

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