



Prevalence of Treponema Species and Periapical Pathology in Endodontic Retreatment Resistant Periapical Lesions

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KEYWORDS

Treponema,
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ABSTRACT:

Background: This study was conducted to assess the Prevalence of treponema species and periapical pathology in endodontic retreatment resistant periapical lesions

Material and methods: Clinical and radiographic examinations were used to select patients who need endodontic retreatment. Patients with systemic disease or those who had received antibiotic treatment during the previous three months were excluded from this research. Samples had been taken from 40 teeth with periapical lesions as well as endodontic failure, and clinical characteristics were documented. After separating the teeth from the oral cavity using a rubber dam, 30% hydrogen peroxide and 2.5% NaOCl were used to disinfect the teeth's exterior surfaces as well as the surrounding area. In order to prevent interference with bacteriologic sampling, the solutions were inactivated using 5% sodium thiosulfate. By obtaining a swab sample from the crown's exterior and streaking it on blood agar plates that were incubated both aerobically and anaerobically, the sterility of the crown's external surfaces was verified. There was a two-step access preparation process. Using species-specific 16S rRNA primers for *T. denticola*, *T. amylovorum*, and *T. maltophilum*, a second nested amplification was used to identify Treponema species. SPSS for Windows was used to statistically analyze the clinical feature data that were gathered from each patient and entered into a spreadsheet (SPSS, Chicago, IL, USA). To ascertain if there were statistically significant relationships between particular species and endodontic signs and symptoms as well as between lesion size and quantity of bacteria, including both positive and negative associations between the species, Pearson's chi-square or Fisher's exact tests were selected.



Results: A single negative sample was eliminated, whereas all other samples tested positive for bacterial DNA using the ubiquitous primer. Contrarily, the negative-control sample showed no signs of bacterial DNA presence, yielding no encouraging results. Out of 30 teeth, 16 showed the presence of *Treponema denticola* and 11 showed the occurrence of *Treponema maltophilum*. *Treponema amyloporum* wasn't evident. *Treponema* species was overall seen in 27/30 cases (90%).

Conclusion: In this study, from the above results it can be concluded that *treponema* species are present in endodontic retreatment resistant periapical lesions. In this study, these species were evident in 90% of the cases.

Introduction

The persistence of symptoms or the presence of periapical lesion which remains unchanged, increased or appeared after endodontic treatment suggest that endodontic retreatment is necessary.¹⁻³ It has long been known that microorganisms resistant to instrumentation or medication (persistent infection) and those contaminating the root canal through coronary leakage (secondary infection) after endodontic treatment are one of the main responsible for endodontic failures.^{4,5}

Intraradicular microorganisms can overcome periapical defense barrier and establish extraradicular infection, which may cause acute apical abscess. Microorganisms that prevail in extraradicular infection are anaerobic bacteria such as *Actinomyces* spp., *Propionibacterium propionicum*, *Treponema* spp., *Porphyromonas endodontalis*, *Porphyromonas gingivalis*, *Treponema forsythia*, *Prevotella* spp. and *Fusobacterium nucleatum*.^{6,7} In classic histology studies, micro-organisms were consistently present in the periapical tissue of cases with clinical signs and symptoms such as acute abscessi and draining sinus tracts, but asymptomatic persistent periapical lesions were generally not infected. There are, however, reports on extraradicular biofilms in asymptomatic periapical periodontitis and chronic apical abscesses with sinus tracts.^{8,9}

Hence, this study was conducted to assess the Prevalence of *treponema* species and periapical pathology in endodontic retreatment resistant periapical lesions.

Material and methods

Clinical and radiographic examinations were used to select patients who need endodontic retreatment. Patients with systemic disease or those who had received antibiotic treatment during the previous three months were excluded from this research. Samples had been taken from 40 teeth with periapical lesions as well as endodontic failure, and clinical characteristics were documented. After separating the teeth from the oral cavity using a rubber dam, 30% hydrogen peroxide and 2.5% NaOCl were used to disinfect the teeth's exterior surfaces as well as the surrounding area. In order to prevent interference with bacteriologic sampling, the solutions were inactivated using 5% sodium thiosulfate. By obtaining a swab sample from the crown's exterior and streaking it on blood agar plates that were incubated both aerobically and anaerobically, the sterility of the crown's external surfaces was verified. There was a two-step access preparation process. Using species-specific 16S rRNA primers for *T. denticola*, *T. amyloporum*, and *T. maltophilum*, a second nested amplification was used to identify *Treponema* species. SPSS for Windows was used to statistically analyze the clinical feature data that were gathered from each patient and entered into a spreadsheet (SPSS, Chicago, IL, USA). To ascertain if there were statistically significant relationships between particular species and endodontic signs and symptoms as well as between lesion size and quantity of bacteria, including both positive and negative associations between the species, Pearson's chi-square or Fisher's exact tests were selected.



Results

A single negative sample was eliminated, whereas all other samples tested positive for bacterial DNA using

the ubiquitous primer. Contrarily, the negative-control sample showed no signs of bacterial DNA presence, yielding no encouraging results.

Table 1: Occurrence of Treponema species, clinical and radiographic features.

Treponema species	Signs and symptoms			Number of cases
	Spontaneous pain	Tender to percussion	Inadequate root filling	
Treponema denticola	+	+	+	16
Treponema amyloporum	-	-	-	00
Treponema maltophilum	+	+	+	11

Out of 30 teeth, 16 showed the presence of Treponema denticola and 11 showed the occurrence of Treponema maltophilum. Treponema amyloporum wasn't evident. Treponema species was overall seen in 27/30 cases (90%).

Discussion

The role of microorganisms in primary endodontic infections was early established.¹⁰ Also, residual intraradicular infection was recognized as the major cause of persistent apical periodontitis. Apart from intraradicular infection, the absence of post-treatment healing can be caused by: aloplastic material in periapex (e.g. extruded root canal filling materials), cholesterol crystals accumulations, and true cysts formation. Also, periapical radiolucency can be caused by scar tissue healing and extraradicular infection that is according to Nair¹¹ generally in the form of periapical actinomycosis. Nevertheless, there are studies that have shown the presence of biofilms on the outer- extraradicular side of the root using scanning electron microscope, and studies reporting that Actinomyces species are not the only infective agents found in unresolved periapical lesions.¹² Wang et al.¹² investigated extraradicular bacterial flora in persistent apical periodontitis, and although the prevalences of Actinomyces sp. and Propionibacterium were the highest, bacterial species were multiple and included Prevotella sp., Streptococcus, Porphyromonas endodontalis, and Burkholderia. In cases with vital and

necrotic pulps there were no microorganisms on extraradicular surfaces, which suggested that extraradicular biofilm is associated with persistent infection after failed endodontics.¹²

Hence, this study was conducted to assess the Prevalence of treponema species and periapical pathology in endodontic retreatment resistant periapical lesions.

In this study, a single negative sample was eliminated, whereas all other samples tested positive for bacterial DNA using the ubiquitous primer. Contrarily, the negative-control sample showed no signs of bacterial DNA presence, yielding no encouraging results. Out of 30 teeth, 16 showed the presence of Treponema denticola and 11 showed the occurrence of Treponema maltophilum. Treponema amyloporum wasn't evident. Treponema species was overall seen in 27/30 cases (90%).

In the study conducted by Foschi F et al (2006),¹³ the effect of mono-infection of the dental pulp with T. denticola and with polymicrobial "red-complex" organisms (RC) (Porphyromonas gingivalis, Tannerella forsythia, and T. denticola) in inducing disseminating infections in wild-type (WT) and severe-combined-immunodeficiency (SCID) mice was analyzed. After 21 days, a high incidence (5/10) of orofacial abscesses was observed in SCID mice mono-infected with T. denticola, whereas abscesses were rare



in SCID mice infected with the red-complex organisms or in wild-type mice. Splenomegaly was present in all groups, but only mono-infected SCID mice had weight loss. *T. denticola* DNA was detected in the spleen, heart, and brain of mono-infected SCID mice and in the spleen from mono-infected wild-type mice, which also had more periapical bone resorption. The results indicated that *T. denticola* has high pathogenicity, including dissemination to distant organs, further substantiating its potential importance in oral and linked systemic conditions.

The study by **Rosa TP et al (2015)**¹⁴ investigated the presence of the *Treponema* species in longstanding endodontic retreatment-resistant lesions of teeth with apical periodontitis, the association of this species with clinical/radiographic features, and the association among the different target species. Microbial samples of apical lesions were collected from twenty-five adult patients referred to endodontic surgery after unsuccessful root canal retreatment. Nested-PCR and conventional PCR were used for *Treponema* detection. Twenty-three periradicular tissue samples showed detectable levels of bacterial DNA. *Treponema* species were detected in 28% (7/25) of the cases. The most frequently detected species were *T. socranskii* (6/25), followed by *T. maltophilum* (3/25), *T. amylovorum* (3/25), *T. lecithinolyticum* (3/25), *T. denticola* (3/25), *T. pectinovorum* (2/25) and *T. medium* (2/25). *T. vicentii* was not detected in any sample. Positive statistical association was found between *T. socranskii* and *T. denticola*, and between *T. maltophilum* and *T. lecithinolyticum*. No association was detected between the presence of any target microorganism and the clinical or radiographic features. It was concluded that *Treponema* species are present, in a low percentage, in longstanding apical lesions from teeth with endodontic retreatment failure.

Conclusion

In this study, from the above results it can be concluded that *treponema* species are present in endodontic retreatment resistant periapical lesions. In this study, these species were evident in 90% of the cases.

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