



Steven Singh DDS

Happy New Year!!!

Our team at Westside Endodontics hopes that each and every one of you had a spectacular holiday and is well rested for yet another year of what lies ahead! We thank you for your continued confidence and entrusting us in talking care of your patients. I look forward to the camaraderie and the development of new relationships with the transitioning new doctors! Con-

gratulations to all you that have found new associateships or have bought practices in 2015. May 2016 be productive for you! Charge ahead....let's make 2016 better than ever!!!!

Does Apical Periodontitis Have Systemic Consequences?

Apical periodontitis (AP) is caused by microbial infection of the root canal system. After invasion by microorganisms, the pulpal tissue becomes necrotic, and the root canal system becomes a haven for microbial biofilms. Concurrently, inflammatory responses occur in the periapical region from the microorganisms and their toxic products. Periapical bone is resorbed to allow for the influx of inflammatory cells, and AP soon becomes visible on a radiograph.

The need for treatment is obvious and mandatory in symptomatic AP, but what if AP is incidentally discovered or a previous root canal treatment has not resolved the AP? It is known that a chronic AP lesion seldom leads to severe problems. This is why asymptomatic AP is often left untreated. However, the potential systemic consequences of AP have been less well studied, and whether AP affects general health has been a concern of the dental profession for decades. van der Waal et al from the University of Amsterdam, the Netherlands, reviewed the literature and reported their findings.

The Swedish Council on Health Technology Assessment (SBU) evaluated the methods used to diagnose, prevent and treat infection and inflammation of the dental pulp. The SBU addressed the question: "Is there a risk that cases of acute and chronic infection originating in the dental pulp may give rise to pathological conditions in other organs?" The SBU concluded that the scientific basis was insufficient to assess the association between endodontic infections and disease conditions of other organs, and when an association was found, that relationship was weak. Thus, either there is no association between AP and systemic health or previously performed studies have not been designed well enough to demonstrate any relationship.

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AP is a local inflammatory response and is part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens and their cytotoxic products, damaged cells or irritants. This response performs several functions:

- It inactivates the injurious agent.
- It breaks down and removes the dead tissue.
- It initiates healing.

A chronic inflammation occurs when an acute inflammation fails to resolve. Chronic inflammatory mediators (IMs) are predominantly

- cytokines and chemokines
- eicosanoids (e.g., prostaglandins, leukotrienes)
- growth factors
- reactive oxygen species
- hydrolytic enzymes

When IMs are continuously expressed, they may spill over into the circulation and exert systemic effects or contribute to existing pathology. IMs can be detected in blood or serum and may therefore serve as a biomarker of inflammation (BOI).

Conclusion

In other areas of dentistry (e.g., periodontal disease) and medicine, comorbidities have been documented. It is important to assess whether persisting AP has an effect on the expression of particular BOIs that may contribute to the development of systemic comorbidities or existing pathology. In an interventional study design, resolution of AP could be evaluated by the expression of BOIs or lack thereof. Once this technology has been refined, it will be valuable when deciding whether or not to treat a persistent endodontic infection.

van der Waal SV, Lappin DF, Crielaard W. Does apical periodontitis have systemic consequences? The need for well-planned and carefully conducted clinical studies. Br Dent J 2015;218:513-516.

Various Irrigation Techniques and Smear Layer Removal

Irrigation is an essential part of the root canal cleaning and shaping procedure, allowing for disinfection beyond what can be achieved by root canal instrumentation alone. Irrigants are used to kill microorganisms, flush debris, dissolve tissue and remove the smear layer from the root canal walls. A smear layer, comprised of dentin shavings, remnants of odontoblastic processes, pulp tissue and bacteria, may limit the disinfection of dentinal tubules by preventing the penetration of intracanal medicaments.

For effective action, irrigants must be brought into direct contact with the entire canal wall. It has been shown that during conventional syringe irrigation (CI), these solutions do not extend much beyond the tip of the irrigating needle. Other irrigation techniques are thus frequently employed:

- Passive ultrasonic irrigation (PUI) uses an ultrasonically activated file to agitate an irrigant within the root canal system.
- The EndoActivator system (Advanced Endodontics, Santa Barbara, CA), a sonic irrigation (SI) system, uses a cordless sonic handpiece to activate strong, highly flexible polymer tips.
- Manual dynamic activation (MDA), considered a cost-effective technique for cleaning the walls of the entire root canal, involves repeated insertion of a well-fitting gutta-percha cone in the presence of an irrigant to mechanically displace and activate an irrigant.

Khaord et al from College of Dental Sciences Bhavnagar, India, compared the smear layer removal after final irrigant activation with PUI, MDA, SI and CI. Twenty extracted human mandibular permanent first molars (40 mesial canals) were selected and divided into 4 groups (n equals 10). After instrumentation was completed, the final irrigation of the samples was performed with 17% EDTA (1 mL) and 3% sodium hypochlorite (NaOCl; 3 mL), followed by normal saline (3 mL).

Samples were examined for smear layer presence under a scanning electron microscope by 2 independent blinded observers. The amount of smear layer remaining on the surface of the root canal or in the dentinal tubules was scored according to the following criteria:

- **0 = no smear layer** was detected on the surface of the root canals, and all tubules were clean and open.
- **1 = moderate smear layer:** No smear layer was observed on the surface of the root canal, but tubules contained debris.
- **2 = heavy smear layer** covered the root canal surface and the tubules.

Table 1. Comparison of smear layer removal ability of all experimental groups with control group

	n	Mean	SD	SE	Minimum	Maximum
PUI	10	0.90	0.316	0.100	0	1
MDA	10	0.60	0.516	0.163	0	1
SI	10	0.40	0.516	0.163	0	1
CI	10	2.00	0.000	0.000	2	2
Total	40	0.98	0.733	0.116	0	2

SD, standard deviation; SE, standard error.

Results were tabulated and statistically analyzed using SPSS software (SPSS, Inc., Chicago, IL), with the level of significance set at p equals .05 (Table 1). There was significantly better smear layer removal with SI (the EndoActivator) than with PUI (p equals .038), and with PUI than with syringe only (p less than .001). No statistically significant difference was found between MDA and SI (p equals .677) or between MDA and PUI (p equals .346).

Conclusion

The study results demonstrated that, of the various methods examined, the EndoActivator sonic device most efficiently removed the smear layer.

Khaord P, Amin A, Shah MB, et al. Effectiveness of different irrigation techniques on smear layer removal in apical thirds of mesial root canals of permanent mandibular first molar: a scanning electron microscope study. J Conserv Dent 2015;18:321-326.

Caries Microbiota in Teeth with Irreversible Pulpitis

Pulpal inflammation is a common result of dental caries. The bacterial effects on the pulp are caused either by bacterial virulence factors and antigens that diffuse through the dentinal fluid or by the bacterial cells themselves, which may reach the pulp via dentinal tubules, especially in very deep caries. It has been shown that in deep dentinal caries, the bacterial composition is substantially different from that of enamel caries.

Most of the species in carious dentin have also been detected in infected root canals, suggesting that these dentinal lesions might well be the primary source of bacteria initiating endodontic infections. Bacterial taxa present in the forefront of deep dentinal caries biofilms are candidate pathogens for irreversible pulpitis and are possibly the first ones to invade the pulp and initiate endodontic infection.

Rôças et al from Estácio de Sá University, Brazil, evaluated several caries and endodontic bacterial pathogens in the most advanced layers of dentinal caries in teeth clinically diagnosed with irreversible pulpitis. This study included 30 patients (23 females, 7 males) with deep occlusal caries in permanent maxillary or mandibular molars. The diagnosis of irreversible pulpitis was based on clinical and radiographic findings, and all cases had extensive caries lesions that led to pulp exposure.

Following tooth isolation and superficial caries removal, a rubber dam was placed, and all surfaces were disinfected. Sterile excavators were used to collect the deepest layer of dentinal caries in direct contact with the pulp, which was then transferred to cryotubes. Transference of the material to the flasks in the clinical setting was performed in the aseptic zone around a flame. Samples were immediately frozen at minus 20 degrees celsius.

DNA extracted from samples taken from deep dentinal caries associated with pulp exposures was analyzed for the presence and relative levels of 33 oral bacterial taxa by using reverse-capture checkerboard hybridization assay. Quantification of total bacteria, streptococci and lactobacilli was also performed by using real-time quantitative polymerase chain reaction. Associations between the target bacterial taxa and clinical signs and symptoms were also evaluated (Table 2).

Table 2. Bacterial taxa significantly associated with demographic or clinical conditions based on semi-quantitative data from reverse-capture checkerboard hybridization assay

Bacterial taxa	p value	Variable
Streptococcus species	.03	Provoked pain
	.03	Intermittent pain
	.04	Throbbing pain
Dialister invisus	.03	Throbbing pain
	.03	Presence of restoration
Parvimonas micra	.01	Throbbing pain

Streptococcus species, *Dialister invisus* and *Parvimonas micra* were associated with throbbing pain, *S mutans* with pain to percussion and lactobacilli with continuous pain (p less than .05). Streptococci and lactobacilli were very prevalent among the represented bacterial population.

Conclusion

This study identified some bacterial taxa associated with advanced caries lesions in teeth with irreversible pulpitis. Some species were more frequently detected in the presence of symptoms.

Bacteria found in high prevalence in the forefront of caries lesions that resulted in pulp exposure may be important pathogens in evoking pulp inflammation. They also may be pioneer species in the pulp colonization process to initiate endodontic infections.

Rôças IN, Lima KC, Assunção IV, et al. Advanced caries microbiota in teeth with irreversible pulpitis. *J Endod* 2015;41:doi:10.1016/j.joen.2015.05.013.



Mon, Tues, Wed, Thurs, 7:30am-5pm

Selected Friday appointment reserved for same day emergencies only.
Emergencies welcome at all times of business hours!



HILLSBORO

434 S. First Avenue
Hillsboro, OR 97123

503.693.6163

Come Visit Us At:

www.westsideendo.com



WASHINGTON SQUARE

9735 SW ShadyLane
Suite 308
Portland, OR 97223

503.693.6163