

The Brown

PerioDontaLetter



I. Stephen Brown, D.D.S., *Periodontics & Implant Dentistry*

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From Our Office to Yours...

As the COVID-19 pandemic continues to grip the nation and the world, recent studies indicate that maintaining good oral health may help prevent the infection, or severe complications of the disease.

Dentistry has a particularly important role to play in keeping the mouth healthy, which, in turn, strengthens the body's immunocompetence in the presence of the virus.

Recent research indicates that treating inflammation may not only help manage periodontal diseases, but may also help with the management of other chronic inflammatory conditions, which includes reducing the incidence of death from pneumonia, the primary cause of death due to COVID-19.

*In this current issue of **The PerioDontaLetter**, we address the importance of periodontal treatment to prevent or mitigate many other life-threatening diseases, including COVID-19.*

As always, we welcome your suggestions and comments.

The Importance of Periodontal Treatment for the Mitigation of COVID-19 and Other Systemic Diseases

A healthy oral cavity acts as a barrier against all kinds of diseases. Data shows that, in areas where poor oral hygiene causes diseases such as caries or periodontitis, there are also more fatal cases of COVID-19.

Furthermore, diabetes, obesity, aging, hypertension, and lung disease have been widely associated with the progression of COVID-19. These same factors are also associated with periodontal disease.

Three recent studies focusing on the oral cavity with regard to

COVID-19 showed improved oral hygiene may reduce the risk of complications from the virus.

One study published in the British Dental Journal showed 20 percent of patients who were reported to have a severe form of COVID-19 had associated higher levels of inflammatory markers and bacteria. This suggests that poor oral hygiene be considered as a risk factor for complications from COVID-19, especially in patients with diabetes, hypertension or cardiovascular disease — comorbidities associated



Figure 1. Personal stress and lack of appropriate care were the likely causes of acute necrotizing ulcerative gingivitis (ANUG) in this patient.

Periodontal Disease And Systemic Disease

As long ago as 2000, the Surgeon General issued a report on the status of oral health in the US, recognizing an association between periodontal disease and other diseases, including cardiovascular and heart disease, stroke, diabetes, and adverse pregnancy outcomes. The report emphasized that “oral health is integral to general health,” and called for more research to determine if causation may be established.

Since the report, evidence of the link between periodontitis and life-threatening systemic diseases has grown to include 22 diseases, including pneumonia, the primary cause of death from COVID-19, and other respiratory tract infections such as COPD and asthma; mouth, throat, pancreatic, gastrointestinal and colorectal cancer; cardiovascular disease and stroke; rheumatic diseases; neurodegenerative disease, including Alzheimer’s and Parkinson’s disease; kidney infection; low fertility in men; erectile dysfunction; brain abscesses; infectious mononucleosis; yeast infections; multiple sclerosis and osteoporosis.

The study of periodontal pathogens and related inflammation has attracted the attention of researchers outside of dentistry due to the potential influence of periodontitis on the initiation and/or progression of several systemic diseases. Two mechanisms have been hypothesized to explain the association between periodontal pathogens and the inflammatory effect.

Periodontal Pathogens

Porphyromonas gingivalis (Pg), along with *Actinobacillus actinomycetemcomitans* (Aa), and *Tannerella forsythia* (Tf) were identified in early studies as the



Figures 2 and 3. Patients who have had to postpone regular periodontal maintenance therapy can develop numerous areas of plaque and calculus, which leads to gingival inflammation and deterioration, and may possibly contribute to systemic disease.

with altered oral biofilms and periodontal disease.

A patient suffering from periodontitis has an open wound of about 40cm² in the oral cavity. It is quite clear that this leaves the door wide open to a disease like COVID-19. This makes it more important than ever for dentists to pay special attention to the association between oral bacteria and disease in other parts of the body.

It is important for patients to be immunologically prepared for COVID-19. Intra-oral status is a fundamental part of this, and is not to be neglected under any circumstances.

One of the biggest challenges has been trying to convince patients that treatment is safe and professional oral care is necessary.

A recent survey showed that 71% of dental patients had concerns about going to the dental office during the COVID-19 pandemic, and patients have delayed seeking medical and dental care. The increase in periodontal tissue destruction arising from delayed professional care has been well documented in the literature.

Those under chronic stress have been found to exhibit increased levels of cortisol in their salivary fluids, which can lead to a decreased immunity and upregulation of various

inflammatory markers. The result of chronic inflammation and decreased immune function can in turn lead to gingival inflammation and the destruction of periodontal tissue.

Coping mechanisms to deal with anxiety, stress, and depression can often involve poor diet, bodily neglect, and deleterious habits such as alcohol, smoking, and drug consumption, all of which can increase inflammation and oral disease.

Many patients whose oral health was controlled under strict periodontal care prior to the pandemic can experience relapse if they are not maintaining professional care. It is imperative that oral hygiene and periodontal care be reinstated to prevent continued breakdown. One study showed that bacteria recolonized teeth six to eight weeks after professional scaling and root planing.

As we emerge from the post-COVID-19 fallout, regeneration of periodontally-compromised teeth is a valued treatment that is both conservative, and may increase case acceptance compared to more costly procedures.

With the ability to save compromised teeth, periodontal therapy is going to play an extremely important role in dental treatment, and procedures such as extraction, grafting, and implant therapy, may possibly be avoided.

bacteria causing periodontal disease. Much of the research on periodontal disease continues to focus on these microorganisms.

Recent studies have determined that the oral cavity contains approximately 500–700 species of bacteria which live in different microbial sub-habitats — in saliva, on gingival epithelium and surfaces of the oral cavity, and concentrate in dental plaque — a microbial community now referred to as the oral microbiota, oral microflora, or oral microbiome.

The oral microbiome seeds the rest of the gastrointestinal tract (and immune system) with a 45% overlap between the microbes found in the mouth and in the colon. Tissue trauma, flossing, dental procedures, or even chewing food may induce breakage of blood vessels in close proximity to the dental plaque, which can introduce bacteria into the systemic bloodstream.

The pathogens circulate throughout the body, and affect distant-site or systemic pathologies — systemic endotoxemia or bacteremia. These pathogens may find favorable conditions, settle at a new site, and multiply, colonize and infect it.

Furthermore, the presence of periodontal pathogens and their metabolic by-products in the mouth may modulate the immune response beyond the oral cavity, promoting the development of systemic conditions.

If the pathogens cause non-oral disease, then they would represent obvious targets for therapeutic intervention. The mere presence of periodontal pathogens alone could potentially be used as diagnostic markers to predict susceptibility to other systemic disease.

The Inflammatory Effect

Beyond the bacteria, a common thread among many systemic conditions is inflammation. While this natural process is essential to healing,



Figures 4 and 5. Fortunately, if treated in time, intervention with periodontal therapy can frequently reverse the disease process and help prevent further periodontal destruction. The elimination of inflammation may have a positive effect on the patient's overall health.

when inflammation becomes chronic, the persistent immune response designed to promote healing can instead become an agent of tissue damage and systemic disease.

Recently, researchers have focused on chronic inflammation in the oral cavity, which may increase levels of inflammatory markers in the bloodstream stimulating an immune response.

Chronic, persistent, low-grade inflammation, such as periodontal disease, produces a steady, low-level of inflammation throughout the body, sometimes signaling white blood cells to develop and increase in numbers, and potentially attack internal organs or other healthy tissues.

Oral microbiota may also increase systemic inflammation through the release of toxins or leakage of microbial products into the bloodstream. The Johns Hopkins Health Review reports chronic systemic inflammation can contribute to the development of disease.

Proinflammatory molecules that enter the bloodstream from oral tissues may also react with circulating antibodies to produce large complexes that give rise to acute and chronic inflammatory reactions. Chronic, low-grade inflammation often does not have symptoms, but doctors can test

for C-reactive protein (CRP), a marker for inflammation in the blood.

High levels of CRP have been linked with an increased risk of heart disease. The Mayo Clinic reports CRP levels can also indicate an infection, or a chronic inflammatory disease, such as rheumatoid arthritis or lupus.

The Effectiveness of Periodontal Treatment

Periodontal treatment has consistently proven to significantly reduce the pathogenic bacteria in the mouth, and therefore the potential contribution of periodontal disease to other systemic diseases.

In November 2017, the World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions found that current evidence indicates that effective treatment of periodontitis can favorably influence the outcomes of systemic diseases.

Mombelli, Kyriaziz, Checchi, Danser and others have shown in multiple studies that effective periodontal therapy substantially reduces the prevalence of periodontal pathogens.

Horibe attributes the significant reduction of periodontal pathogens

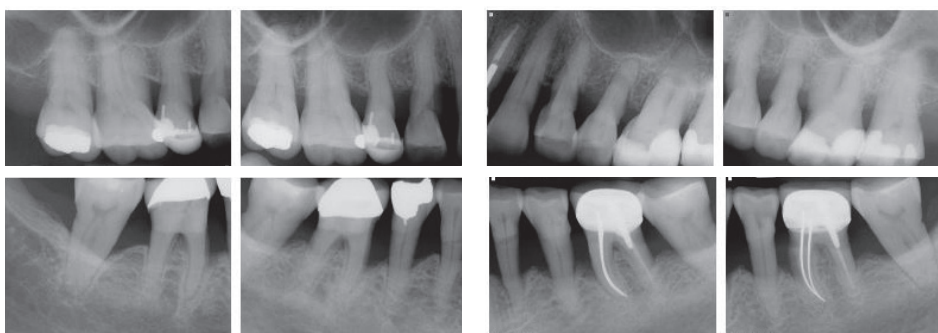


Figure 6. This patient with advanced periodontal destruction must stay on a frequent and regular periodontal maintenance program to help prolong the life of their natural dentition.

following surgical treatment to the fact that tissue management may lead to an altered host immunologic response to pathogenic species, which later on may exhibit beneficial clinical effects.

It has also been suggested that environmental changes resulting from periodontal surgery, may lead to a shift in the sub-gingival microflora, and that the final bacterial composition is more compatible with an oral health status.

Systemic antibiotics as an adjunct to conventional surgical and non-surgical therapy have been shown to be beneficial in reducing pathogenic bacterial load.

Slots has said the systemic delivery of antibiotics has the advantage of reaching deep pockets and furcations, into gingival tissue, and other oral sites.

Several clinicians have reported that laser treatment is effective in eliminating bacteria in periodontal pockets, and they are increasingly being used in the treatment of periodontal disease.

McCawley and Rams found that the NdYag Laser reduced all cultivable pathogens to non-detectable levels in 85% of periodontal pockets, and most were still at low levels 7.5 months later.

Cobb, McCawley and Killoy et al found scanning electron microscopy

examinations showed calculus deposits were free of their characteristic surface layer of microbial plaque following root planing and various laser protocols. They also found DNA probe testing showed elimination of Aa, Pg and Pi on eight of 11 laser-treated teeth.

The Oral Cavity as a Diagnostic Tool

The realization that oral health is linked to systemic disease and can affect the progression or development of diverse diseases has led to the search for biomarkers in the oral cavity that could detect systemic disease.

It is well accepted that patients visit their dentists on a more regular basis than their primary care physicians. Thus, use of the oral cavity for early diagnosis of systemic disease should increase the likelihood of successful treatment of many non-oral diseases.

Since the collection of saliva is quick, simple, and non-invasive, saliva is becoming an attractive diagnostic tool for the identification of a plethora of systemic diseases.

The analysis of multiple biomarkers in saliva could help to detect the

presence of several diseases simultaneously; and electrochemical sensor systems could quickly detect salivary protein and genetic markers for diagnosis with high specificity and sensitivity, allowing health care providers to screen for systemic diseases easily and quickly.

Current progress has been made with the development of “omics”-based markers for some diseases. Microbiomics, methylomics, and metabolomics, among other high-throughput approaches, have shown promising potential for detection of some diseases. Further research is needed in many cases to confirm the specific type of disease. Although this field is in its infancy, it is likely dental practitioners may soon be diagnosing many non-oral systemic diseases in their clinic.

Microscopic monitoring of bacteria and parasites has also proven to be an effective in-office diagnostic test.

Conclusion

It is clear that management of periodontal disease and proper oral care can positively impact the morbidity, mortality, and health care costs associated with non-oral systemic diseases, including COVID-19.

Realizing that optimal oral health saves lives, dentists are changing the way they practice to emphasize the connection between periodontal disease and other life-threatening diseases.

These findings suggest a future of greater collaboration with our medical colleagues to identify and effectively control many systemic diseases.

