

The Often-Forgotten Dental Care Connection

The chemistries of commonly recognized diabetic microvascular complications, vascular disease and delayed wound healing have similarities to periodontal disease.

BY J. EDWARD KENDRICK, DDS

Separation of dental care from medical care in health insurance and government health program plans reflects the historic separation of dental from medical in many training institutions, professional associations, professional journals and public perceptions. Going to the dentist for teeth cleaning has long been associated with other cosmetic activities such as getting hair styled and nails manicured. The importance of dental health in the context of total health is gaining recognition through results of recent scientific studies as reported in the popular press. In *Oral Health in America 2000*, the Surgeon General identified the epidemic of dental disease as a priority to focus upon in promotion of health.

Connections between dental health and diabetes have long been recognized. Associations between diabetes and periodontal disease were published in the *Journal of the American Dental Association* in 1923 in an article entitled "Diabetic Periodontoclasia," which references European literature as far back as 1894. Reviews of current science affirm long-realized associations such as (1) increased risk for periodontal disease in people with diabetes, particularly uncontrolled diabetes, (2) likely benefits for better glycemic control when periodontal disease is treated and periodontal health is maintained and (3) links of inflammation in periodontal disease to increased insulin resistance.

DENTAL LINK TO OPATHIES

The chemistries of commonly recognized diabetes complications such as nephropathy, neuropathy, retinopathy, vascular diseases and delayed wound healing have such similarities to periodontal disease that periodontitis is becoming generally accepted as the sixth *opathy* of diabetes.¹ Advanced glycation end products (AGEs) are formed in the periodontium at higher levels in people with diabetes, and vascular endothelial growth factor was recently found to be elevated in gingival tissues of people with diabetes.²

Host immune competence, known to be compromised by high HbA1c levels, also plays a key role in the increased prevalence and severity of periodontal disease in diabetes. Conversely, many studies demonstrated that treatment of periodontal infections confer benefits in glycemic control.

The tendency for gingival inflammation and bleeding is much greater in patients with high HbA1c. Hyperglycemia results in increased receptor for AGEs (RAGE) expression and AGE-RAGE interaction on the endothelium, causing an increase in vascular permeability and thrombus formation.³ Infiltration of neutrophils, macrophages and various lymphoid cells into the inflamed gingiva stimulates synthesis of inflammation producing interleukin-6, tumor necrosis factor-alpha, prostaglandin E2, C-reactive protein (CRP) and various matrix metalloproteinases. These chemistries promote inflammation, increasing alveolar bone loss and alter healing capacity.

In addition to diabetes, infection in the mouth has increasingly been associated with systemic disease conditions. CRP is found to be elevated in patients with periodontitis.⁴ Obesity has been shown to be a risk factor for periodontitis for similar reasons that obesity increases risks for diabetes.⁵

ORAL DISEASE INCREASES OTHER RISKS

Oral disease, especially periodontitis, raises susceptibility to myocardial infarction, stroke, premature births, low birth weight, pneumonia, stomach ulcers and can exacerbate rheumatoid arthritis conditions. In vascular disease, one hypothesis involves oral pathogens gaining access to the circulatory system and playing a role in development of atherosclerosis. DNA from periodontal pathogens has been identified in atherosclerotic plaques removed from carotid and femoral arteries in human studies. Increased loads of subgingival bacteria may present a risk for systemic health.⁶

The Insulin Resistance Atherosclerosis Study (IRAS) pro-



Figure 1. Severe gingival inflammation can be an initial presenting sign for diabetes. Glucometer use by dentists can assist in identifying undiagnosed diabetes.



Figure 2. Pocket measurements with a calibrated probe locates periodontally diseased sites where periodontal therapy is needed.



Figure 3. Radiographic evidence of alveolar bone loss is illustrated with the positioning of the periodontal probe. Measurements >3.5 mm are considered disease-potential sites.



Figure 4. Alterations in the serous/mucous balance and volume of saliva occur in diabetes and as a side effect of many prescription medications. Frothy saliva is one indicator of xerostomia. Saliva analysis presents possibilities for assessing health status, perhaps adding to what we now learn from blood chemistry tests.

vided evidence demonstrating that inflammation is associated with insulin sensitivity, even in patients without diabetes.⁷ As inflammation increasingly becomes a focus of diabetes complications, dental therapies using 20 mg doxycycline twice daily — a unique subantimicrobial dose — may have application for overall systemic reduction of serum levels of inflammatory markers. Research has shown that 20 mg doxycycline works by suppressing pathologically elevated levels of inflammatory cytokine activity and tissue-destroying enzymes in gum tissue, which arise due to the chronic bacterial infection that initiates periodontitis. It is these same cytokines and enzymes that have been demonstrated in all of the 'opathies of diabetes.

LOW-DOSE DOXYCYCLINE

Approved by the US Food and Drug Administration for long-term use in the adjunctive treatment of adult peri-

odontitis in 1998, low dosages of doxycycline have been widely adopted by the dental and periodontal professions, and more than 3 million prescriptions have been written for its use. Arising in dentistry, this drug regimen holds some promise as a general reducer of circulating inflammatory chemistries, and results indicate further studies on the benefits of controlling development of inflammatory chemistries that characterize conditions of diabetic morbidity.

An often-forgotten aspect of diabetes care is dental and periodontal care. Hospital admission forms seldom include any more dental history than whether the patient wears removable dentures. Discerning dentists and periodontists can function as initial referral sources in the new diagnosis of diabetes through careful observation of abnormal gingival inflammation and through use of glucometers in presurgical screening.

Pain from periodontal disease is generally a late-stage

indicator of problems. Patients may seek medical advice for pain referred to sites outside the mouth — or for malaise, tinnitus, dizziness, earache, sinus pain, eye pain, neck pain, sore throat, metallic taste, dry mouth, burning mouth, facial paralysis, sore joints — not realizing the possibility exists for dental and periodontal etiologies of their presenting complaints.

ULCERATED EPITHELIUM

Sealed behind closed lips, the total area of ulcerated epithelium in the inflamed pockets surrounding the teeth in moderate to advanced periodontitis conditions can approach 6 cm² in size. Such a lesion anywhere else on the body of a patient with diabetes would be cause for alarm and likely referral to a wound clinic. Science would direct that clinical guidelines for maintaining patients with diabetes include dental and periodontal treatment and reevaluation visits at least every 6 months.

The Missouri Dental Association (MDA) is proactive in bringing awareness of oral health in the context of total health. Visit www.modental.org/yourdentalhealth/AlliedHealthConnection.aspx for more information. With advocacy from the MDA, the Missouri Diabetes Advisory Board in August adopted recommended clinical guidelines that include dental screening and dental/periodontal referral during diabetes management visits. Through the inclusion of dentists and periodontists on the diabetic management team, more effective results for overall health are expected for people with diabetes. More information is available at www.dhss.mo.gov/diabetes/FinalManagementGuideline.pdf.

Periodontal health is integral to overall health. A person cannot be considered healthy if the mouth is unhealthy. ■

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1. Løe H. Periodontal disease. The sixth complication of diabetes mellitus. *Diabetes Care*. 1993;16(Suppl.1):329-334.
2. Unlu F, Gurdal Guneri P, Hekimgil M, Yesilbek B, Boyacioglu H. Expression of vascular endothelial growth factor in human periodontal tissues: Comparison of healthy and diabetic patients. *J Periodontol*. 2003;74:181-187.
3. Mealey B, Oates T. Diabetes mellitus and periodontal diseases. *J Periodontol*. 2006;1289-1302.
4. Noack B, Genco RJ, Trevisan M, Grossi S, Aamton JJ, De Nardin E. Periodontal infections contribute to elevated systemic C-reactive protein level. *J Periodontol* 2001;72:1221-1227.
5. Saito T, Shimazaki Y, Sakamoto M. Obesity and periodontitis. *N Engl J Med*. 1998;339:482-483.
6. Dögan B, Buduneli E, Emingil G, et al. Characteristics of periodontal microflora in acute myocardial infarction. *J Periodontol*. 2005;76:740-748.
7. Festa A, Jr D'Agostino R, Howard G, et al. Chronic subclinical inflammation as part of the insulin resistance syndrome: the Insulin Resistance Atherosclerosis Study (IRAS). *Circulation*. 2000;102:42-47.

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