

Diabetes and Oral Health: What's the Connection?

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Objectives

- Recognize the signs and symptoms of gingival health, gingivitis, and periodontitis during dental screenings.
- Describe how gum disease can be associated with certain complications of diabetes, as well as poor control.
- Identify at least one change you will incorporate into your clinical or community health practice as a result of this training.

Healthy Gums

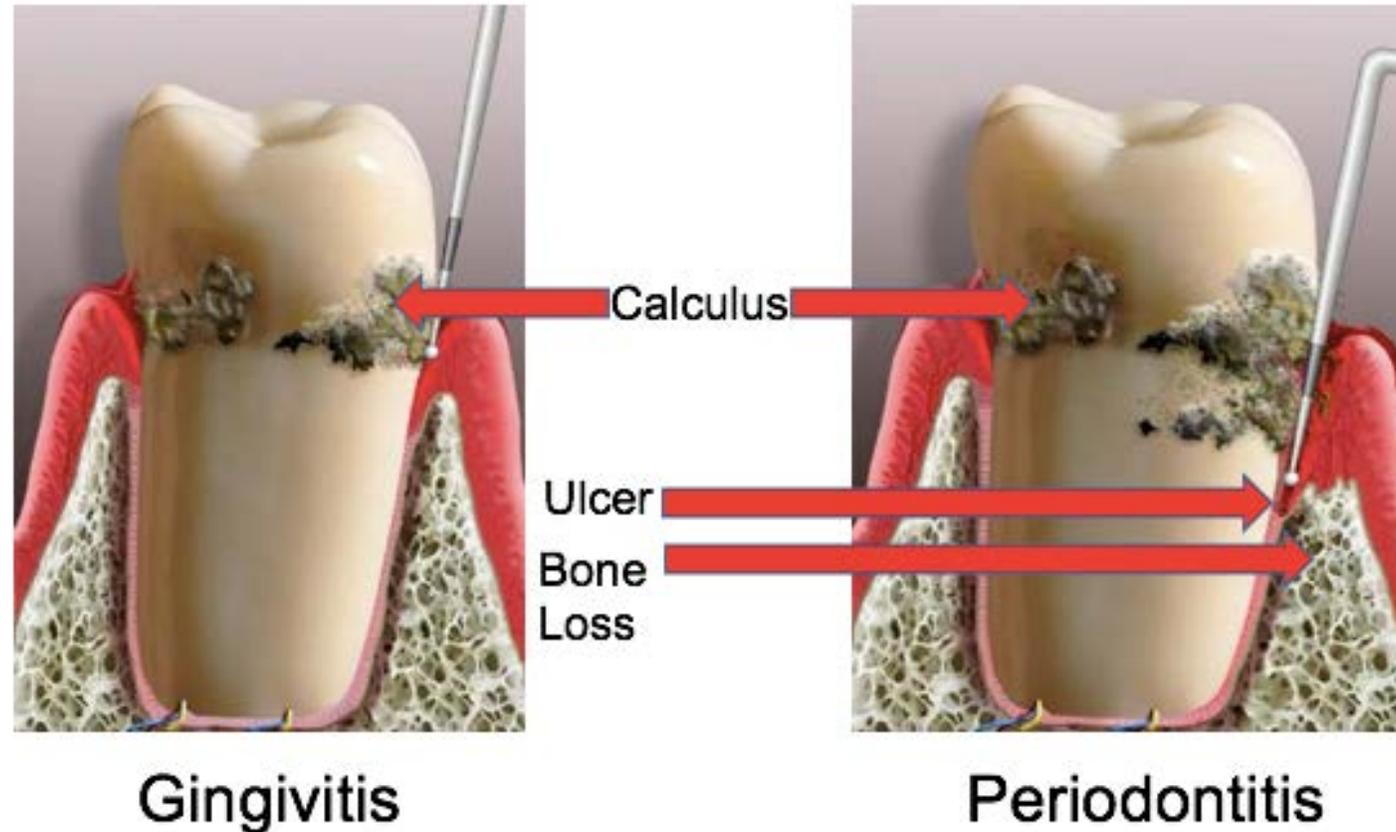


Periodontal Diseases

- The two most common types of periodontal disease are gingivitis and periodontitis

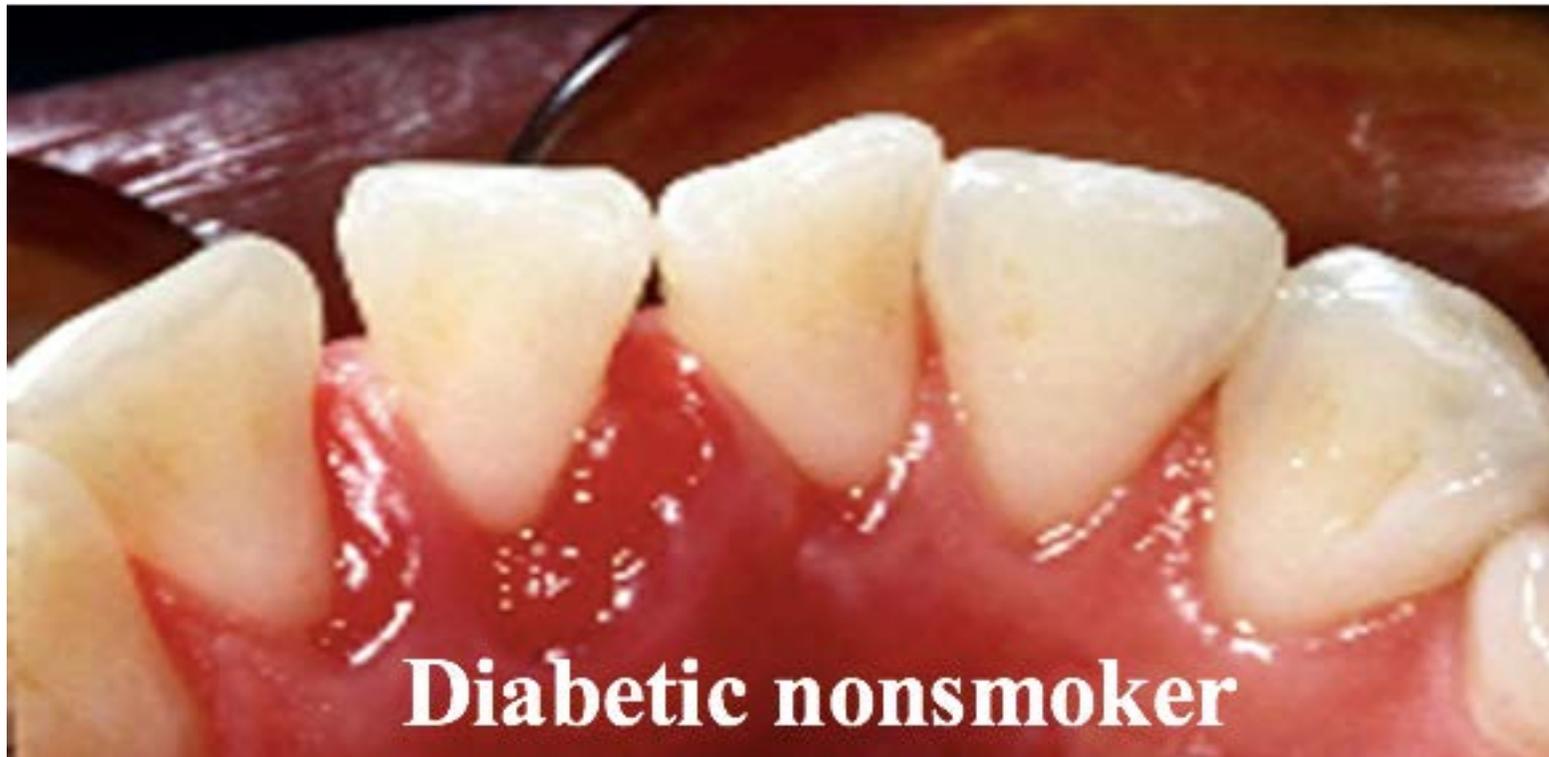


Measuring the Pockets Associated with Periodontitis



Illustrations by Dr. Tom Taylor

Gingival Polyps/Granulomatous Tissue



Diabetic with Severe Periodontitis and Oral Inflammation



Prevalence of Periodontitis

US adults over 30 with teeth:

- 8.7%- mild form
- 30.0%- moderate form
- 8.5%- severe form

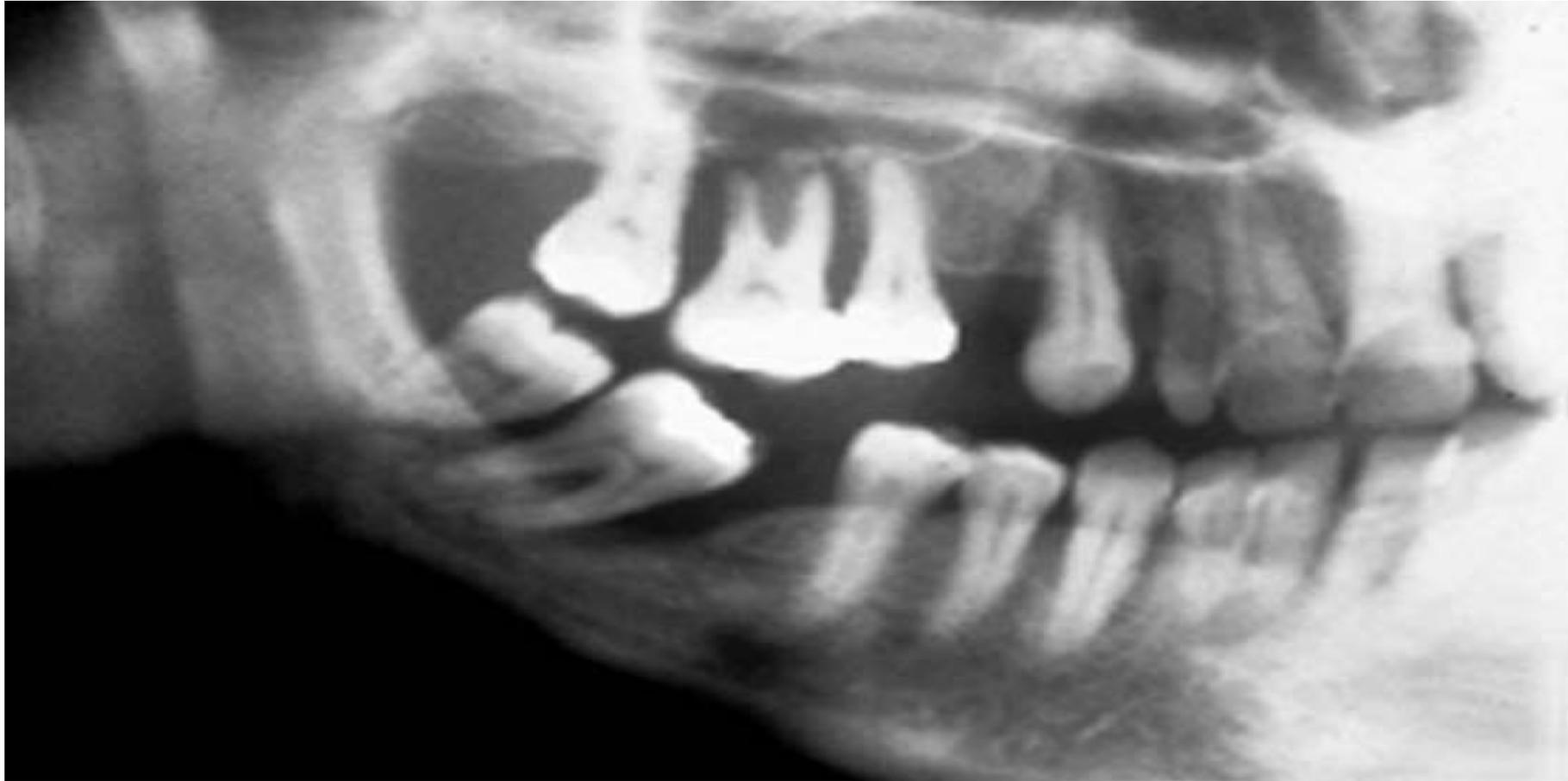
Much higher prevalence than previously thought; almost 50% of adults have periodontitis.

- 17% – severe form in AI/AN age 35 and over

NHANES 2010, n=3742, Eke, JDR 2012

IHS 2015, Phipps and Ricks

Severe Periodontitis- Molars Only



Diabetic with a History of Severe Periodontitis, but Healthy Gums and Stable Bone Levels



Undetected Diabetics with Periodontitis



Oral Effects in Patients with Diabetes

- Increased gingivitis and periodontitis
- Caries
- Intraoral slow healing
- Xerostomia
- Burning mouth and tongue
- Cheilosis and moniliasis
- Multiple periodontal abscesses



The Evidence/Association

- A review of 55 studies involving subjects with diabetes found consistent evidence of increased:
 - Prevalence of periodontitis
 - Incidence of periodontitis
 - Severity of periodontitis
 - Extent of periodontitis
 - Progression of periodontitis
- Periodontitis is more prevalent in those with poorer glycemic control.
- When the blood sugar is under control, there is no greater risk for severe periodontitis.

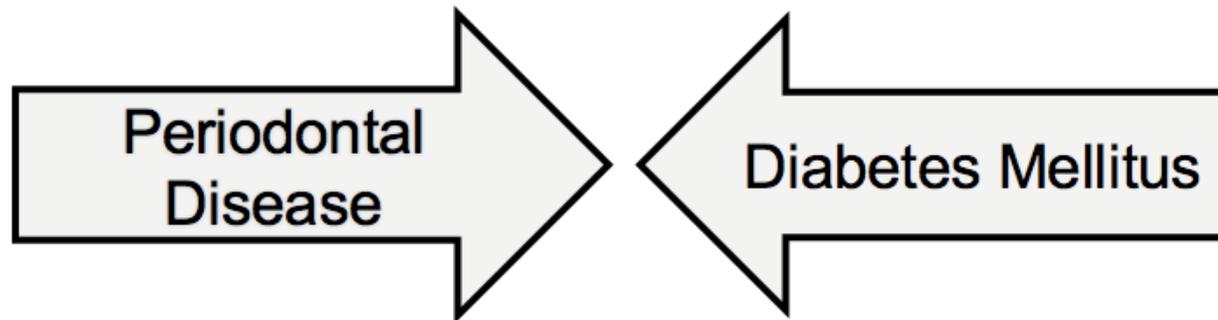
Tsai 2002 NHANES III analysis, Nitta 2017

Taylor 2008, Garcia 2015



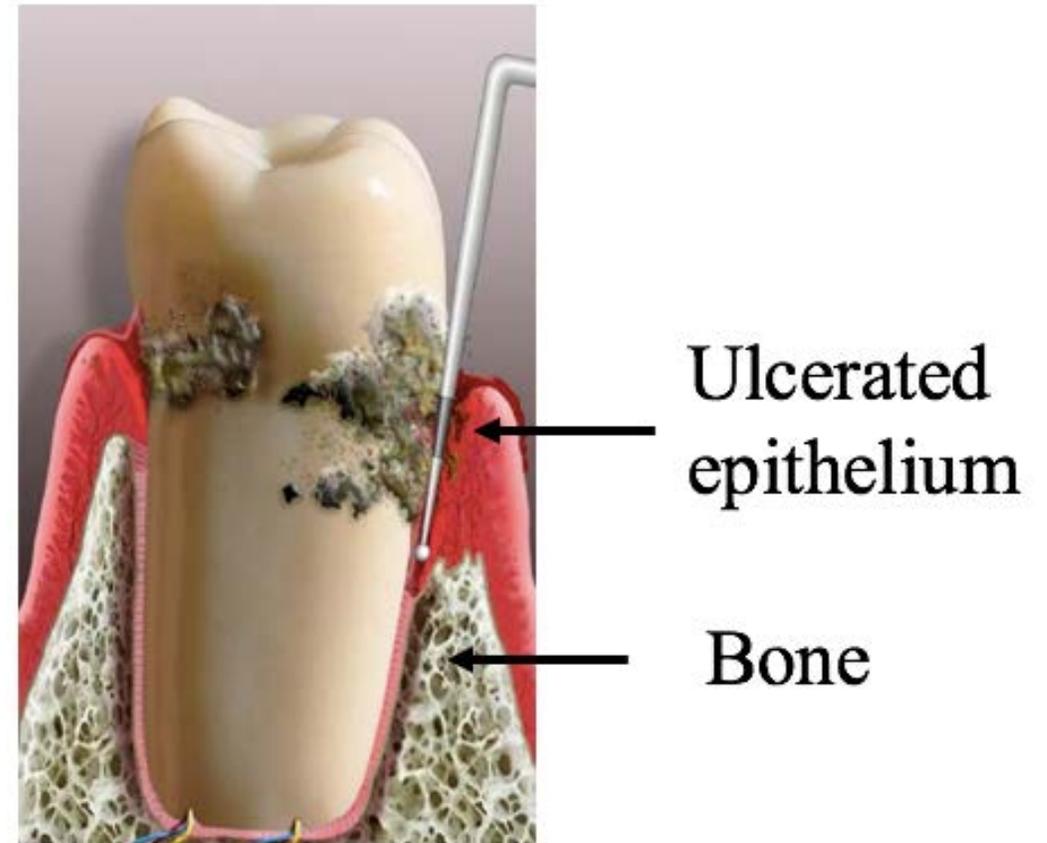
The Two-Way Relationship

- Does periodontitis increase risk of:
 - Poorer glycemic control?
 - Increased risk of diabetes complications like heart attacks and kidney disease?
 - Mortality?



The Systemic Connection Bacterial Access and Inflammatory Response

- Ulcerated epithelium within infected periodontal pockets allows bacteria, toxins, and inflammatory mediators access to the blood stream.



Before and After Removing Heavy Calculus

- Heavy calculus and immediately after its removal demonstrating inflammation and ulceration
- In a patient with moderate to severe periodontitis, there is an estimated 10–20cm² of ulcerated surface and area of tissue necrosis.
 - Hujuel 2001



Gum Disease

- Gum Disease is usually painless and easy to ignore



Periodontitis and Systemic Inflammation

- Pro-inflammatory cytokines (IL-1, IL-6, TNF- α) and prostaglandins (PgE2) accumulate in the gum tissues in active periodontitis at extraordinary levels and can enter the circulation.
 - Salvi 1997
- Periodontitis is an anaerobic infection flooding the blood stream 24 hours a day with endotoxins and inflammatory mediators.
 - Offenbacher, 1998
- Periodontitis is associated with increased systemic inflammation and oxidative stress, which are decreased by periodontal treatment (hsCRP, IL-6, TNF- α , OHdG).
 - Genco 1998, Mattila 2002, Taylor 2006, Marcaccini 2009, Hendek 2015

Periodontal Medicine - Periodontal Diseases Have an Effect on Certain Systemic Conditions

- Not all oral bacteria are created equal.
- Stealth-like properties enable oral organisms to persist at extra-oral sites, even for years, through immune evasion, selective virulence, and the ability to disseminate.
 - Offenbacher 2004
- *S mutans* serotype e, f, and k; *Campylobacter concisus* Cluster I; *Fusobacterium nucleatum* sbsp *animalis*; oral *Treponema*; and certain *P. gingivalis* strains are more prevalent in extra-oral infections.
 - Han JDR 2013

Periodontitis Aggravates Diabetes and Its Complications

- Diabetic subjects had an increased risk of a worsening of HbA1c over two to three years when severe periodontitis was present at baseline.
 - Pima study. Taylor et al, JOP 96
- Findings confirmed of increased risk in Type 2 DMs with severe periodontal disease.
 - Collins 1998
- Patients with IDDM had significantly higher prevalence of proteinuria and cardiovascular complications such as stroke, TIA, angina, and MI when severe periodontitis was present at baseline.
 - Thorstensson J Clin Perio 1996
- Severe periodontitis and periodontitis progression were associated with increased HbA1c in Type 2 DMs.
 - Costa JOP 2017

Periodontal Disease Is a Strong Predictor of Mortality from Ischemic Heart Disease and Diabetic Nephropathy in Pimas with Type 2 DM.

- Prospective longitudinal study (median 11 years) on the effect of periodontitis on cardiovascular mortality.
- After adjusting for many factors, for IHD:
 - No/mild periodontitis 0 deaths/1000 person-years
 - Moderate periodontitis 4.8 deaths/1000 person-years
 - Severe periodontitis 5.7 deaths/1000 person years
- For diabetic nephropathy:
 - No/mild periodontitis 0 deaths/1000 person-years
 - Moderate periodontitis 0.5 deaths/1000 person-years
 - Severe periodontitis 5.3 deaths/1000 person-years (p<0.01)
- **(Severe periodontitis = 2.3 X higher risk of cardio mortality and 8.5 X higher risk of renal mortality)**
 - Saremi et al, Diabetes Care 2005, n= 628

Effect of Periodontitis on Overt Nephropathy and ESRD in Type 2 Diabetics.

- Incidence of macroalbuminuria and ESRD increased with severity of periodontitis.
- After adjusting for many factors, compared to those periodontally healthy:
 - Moderate periodontitis OR ESRD 2.3
 - Severe periodontitis OR ESRD 3.5
- **Conclusion: Periodontitis predicts development of overt nephropathy and ESRD in a dose dependent manner in individuals with type 2 DM.**

Shultis et al, Diabetes Care 2007 n=529

Periodontal Therapy Improves Diabetic Control

- Scaling and root planing provide a significant improvement in glycemic control (average 0.40% decrease) in the majority of studies and meta-analyses.
- Perio treatment leads to improved glycemic control for at least three months.
- It is not clear if and when antibiotics and other antimicrobial treatments improve diabetes.



Periodontal Therapy and Diabetic Control –Recent Reviews and Meta-analyses

- Janket et al JDR 2005
 - Meta analysis of 10 intervention trials. NS but HbA1c decreased 0.7% with abx, 0.4% without.
- Darre et al Diabetes Metab 2008
 - Meta analysis/Systematic review of 25 studies. SRP provided a small but significant improvement in glycemic control (mean 0.79% decrease).
- Teeuw et al Diabetes Care 2010
 - Meta analysis/Systematic review. 5 articles met inclusion criteria. Perio treatment leads to an improvement of glycemic control in Type 2s for at least 3 months.
- Simpson. Cochran Library 2010.
 - Treating perio may lower blood sugar levels in type 2s. Limited evidence type 1s.
- Engebretson JCP/JOP 2013
 - Meta analysis mean 0.36% decrease.

Effect of Nonsurgical Periodontal Therapy on Hemoglobin A1c Levels in Persons with Type 2 Diabetes and Chronic Periodontitis

- Engebretson JAMA 2013
- Largest, multicenter, RCT n=514. Mod-severe cp.
- Treatment: SRP/LA, OHI, CHX for 2 weeks
- Conclusion: Perio therapy did not improve glycemic control.
- Results: After treatment,
 - 71% had high plaque scores
 - 42% had bleeding on probing
 - 10% had pockets \geq 5mm.
- No local or systemic antibiotics were used to help control the gram negative infection of periodontitis.
- Overall, no high quality evidence that SRP improves glycemic control.
 - Simpson, Cochrane Database Syst Rev 2015

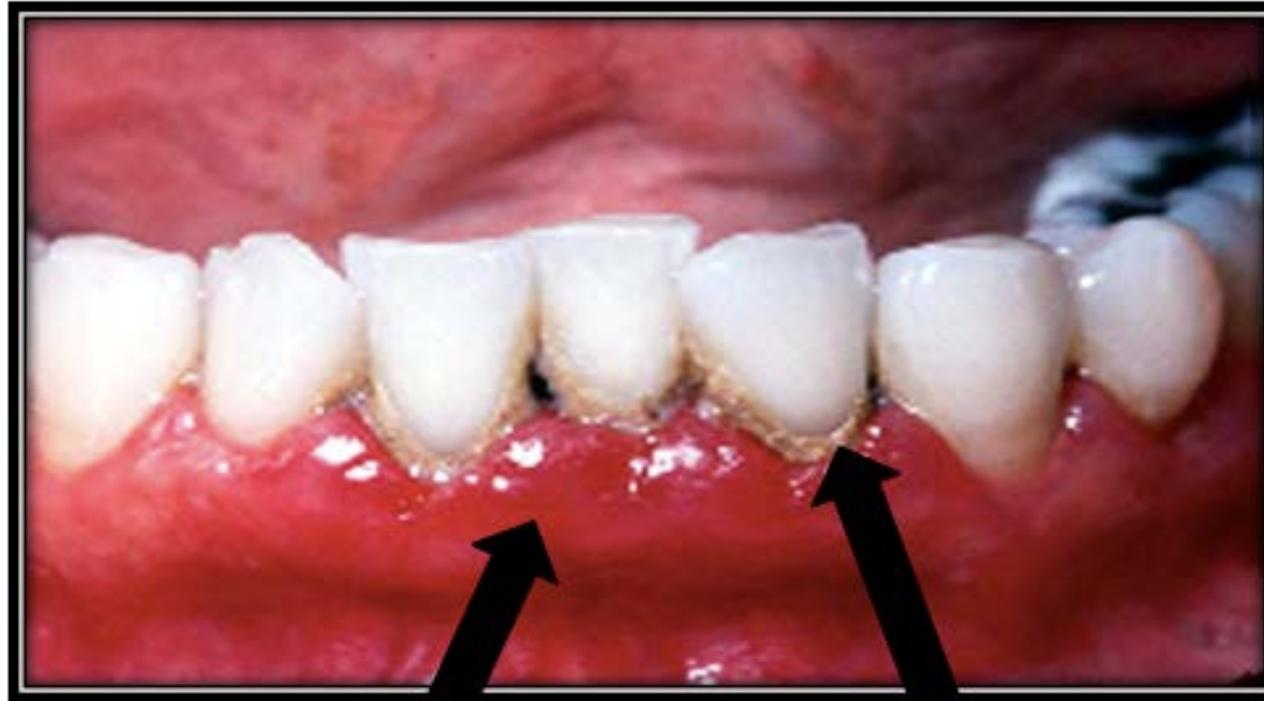
Periodontal Treatment Terminology

- **Gingivitis – Prophy or Prophylaxis. Cleaning.**
- **Periodontitis-**
 - **Deep Scale or SRP** (Scaling and Root Planing) – often under topical or local anesthetic to numb the gums.
 - **Flap Curettage** – Surgery to expose the teeth and roots to remove the calculus under the gums.
 - **Regeneration or Bone Grafting** – Surgery to rebuild the bone around the teeth.

Dental Treatment Protocol in Diabetics with Moderate to Severe Periodontitis

- Intensive oral hygiene instruction and motivation
- 1/2 mouth deep scaling with local anesthesia
- Extract hopeless teeth that can't improve with therapy
- Antibiotic
 - Doxy 100mg bid X 14 days or Augmentin 500mg bid X 10 days
- Antimicrobial mouth rinse
- Analgesic
- Recall in 3–6 months

Before Scaling the Teeth/Deep Cleaning



Inflamed Gums

Calculus

Patient Return at Six Months after Cleaning



Healthy gums with
no inflammation,
local or systemic

Calculus
Removed

Before and After Treatment: Six Months

- Generalized Moderate to Severe Periodontitis HbA1c = 11.3
Compared with Six months After Deep Cleaning and
Doxycycline



Before and After Treatment: Three Years



Generalized Severe Chronic Periodontitis

- 28-year-old with FBS 347 – Protocol treatment



Generalized Severe Chronic Periodontitis – Post Protocol

- Periodontal health improved two months post-protocol

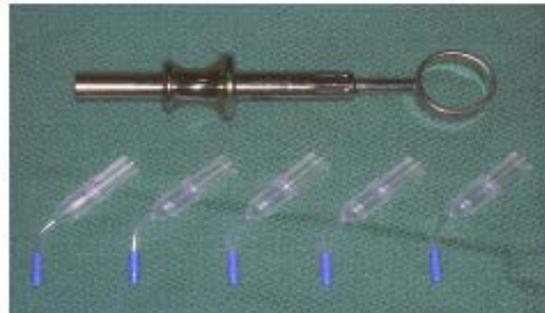


Severe Periodontal Breakdown in a Poorly Controlled Diabetic After No Dental Care for Two Years Post Periodontal Treatment



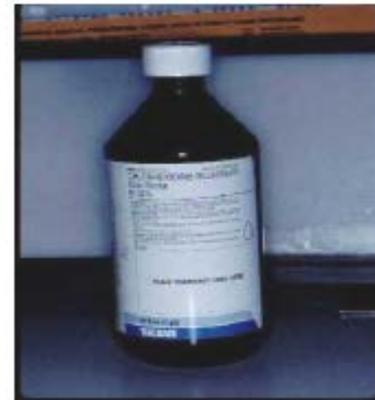
Treating Periodontitis

- Scale the teeth and roots to remove bacteria and calculus, and use antimicrobials, decreasing inflammation and infection.



Home Care

- The use of powered toothbrushes, mouth rinses and toothpastes with antiseptic agents should be recommended.



Home Care (cont.)

- Home care is critical, particularly cleaning between the teeth.
- Help the patient understand: “Diabetes increases risk for severe gum disease, and gum disease can make it harder to control your blood sugar.”



Perio Treatment Can Decrease Medical Costs for Patients with DM

- Early treatment of periodontitis (first year) lowered total medical costs for Aetna members with DM, CAD, and stroke.
 - Albert, BMC Health Services Res, 2006
- Blue Care Network (MI) – Medical costs for DMs decreased 11%/month with one or two perio treatments per year versus no treatment.
 - Taylor 2009, n= 2674
- BC/BS of MA – Dental care decreases medical costs \$144 per member per month. (\$238 if CAD).
- Regular dental cleanings reduced hospitalizations and ER visits for diabetes-specific medical care (versus those who didn't receive dental care.)
 - Mosen 2012
- Completing periodontal therapy and recalls reduced hospitalizations by 39%, with \$2840 annual reduction in overall medical costs (compared to those who did not complete their cleanings or recalls).
 - Jeffcoat, Am J Pre Med 2014
- Perio treatment in newly diagnosed Type 2 DM patients is associated with lower total healthcare costs (-\$1799) in those not receiving DM prescription drug therapy.
 - Nasseh Health Economics 2016

Periodontal Treatment and Maintenance Reduces Medical Visits and Costs

- For diabetes patients:
 - 33% reduction in hospitalizations
 - 13% reduction in physician visits
 - \$1814 annual reduction in overall medical costs
 - Jeffcoat, AADR 2012
 - \$1477 annual reduction in drug (Reported 11/2012)

First year periodontal therapy with maintenance visits second and third years vs controls with incomplete treatment and no maintenance.

1.7 million United Concordia dental and Highmark medical coverage individuals.

Findings are Leading to Broader Dental Coverage

- Aetna now provides additional prophylaxes as well as full benefits for SRP, recalls, and local antimicrobials for patients with CVD and DM. 2007 “Dental/Medical Integration Program” also includes pregnant members.
- In 2006, CIGNA Dental expanded its Oral Health Integration Program, promoting treatment of gum disease for members with DM and CVD. Provides 100% reimbursement for out of pocket costs for SRPs and recalls. “Gum Disease Risk Assessment” online.
- BC/BS of MA provides 100% coverage of SRPs, and prophylaxes every three months, which don’t count towards the yearly maximum.
- Delta Dental of MI, OH, TN, MA, and IN doubled the number of prophys annually for many med comp pts.
- United Health Care has increased dental coverage.
- United Concordia-100% coverage for SRPs and perio surgeries for DM, heart disease stroke, RA, and pregnancy.

Medical Guideline for Health Care Workers on Oral Health for People with Diabetes

- Enquire about regular oral health check ups.
- Enquire at least annually for symptoms of gum disease, and to seek treatment if present.
- Remind that adequate daily home care is a normal part of diabetes self-management.
- Educate on the relationship between diabetes and gum disease.

International Diabetes Federation 2009

Know your referral process to Dental.

Example:

- At PIMC
 - For toothache/acute care no referral should be required
 - For a Dental exam:
 - Provide an oral screen for patients with diabetes
 - If > 1 year since last dental exam or signs of gum disease present:
 - Complete a “Golden Ticket,” or
 - Enter referral into the EHR, or
 - Go to dental to get an appointment.

Summary

- Chronic inflammation is the link between many illnesses, including diabetes and periodontitis.
- Diabetes increases risk for periodontitis, and periodontitis increases risk for diabetic complications and poorer metabolic control.
- Periodontal treatment reduces the cumulative systemic pathogen and inflammatory burden throughout the body. “The consequences of under-treatment could be more than the loss of a few teeth.” – McGuire 2008
 - For additional info see the Clinical Tools for the Oral Health Best Practice (Web sites listed below)

<https://www.ihs.gov/diabetes/?CFID=55041234&CFTOKEN=48118080>

<https://www.perio.org/>