Focus on Furcas: A Furca Forum

Gum Gardeners Perio Study Club
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Lori Killen Aus RDHEP, MA

AAP Definitions:

- Anatomic area of a multi-rooted tooth where the roots diverge
- Furcation Invasion: Pathologic resorption of bone within a furcation
- Cl I: Incipient loss of bone limited to the furcation flute that does not extend horizontally
- Cl II: A variable degree of bone loss in a furcation, but not extending completely through a furcation
- Cl III: Bone loss extending completely through the furcation
- Cl IV: Similar to Cl III with gingival recession exposing furcation to view

"Unfortunately, dentists and dental hygienists frequently fail to detect furcations. This can lead to liability problems when undetected furcation invasions undergo rapid breakdown or develop abscesses." **Dimensions of DH June 2010 Adapted from Pattison A, Matsuda S. Pattison G. Periodontal Instrumentation, 3rd Edition, Pearson Education, New Jersey, In Press.**

Red Complex *Porphomonas Gingivalis, Treponema Denticola, Tannerella Forsythia and Aggregatibacter Actinomycetemcomitans*

- Gram negative
- Anaerobic
- Colonizers/Quorum sensors
- Disturbing host systems
- Invaders – destroying perio tissues
- Promotes immunodestructive host response Bodet et al PathBio(Paris). 2007 Apr-May; 55(3-4):154-62.

Teles, Haffajee, Socransky. *Microbiological goals of periodontal therapy*. **Periodontol 2000. 2006;42:180-218.**

→Oral Health is Inseparable from Systemic Health←

Stuart Froum DDS, AAP President and clinical prof. and director of Perio Research NYU
"The relationship between PD and diabetes is a bit of a catch-22. People living with diabetes are more likely to develop PD. At the same time, PD makes it more difficult for people with diabetes to control their symptoms because it can impair the body's ability to process and/or utilize insulin." Accessed 11/17/2014
http://www.perio.org/consumer/bio_froum2013

Alzheimer's: Type 3 Diabetes?

AD – metabolic disease characterized by a neurodegeneration and mediated by impairment of glucose utilization and energy production.

de la Monte SM, Tong M, Wands JR Insulin Resistance, Cognitive Impairment and Neurodegeneration: Alzheimer's Disease Pathogenesis: Care, Concepts, Shifting Paradigms and Therapeutic Targets.

P. gingivalis suppresses the body's immune system while also insuring its own maintenance and survival. It has the ability to take over a complimentary protein – C5, and inhibit communication with the receptors. These receptors are the ones that alert white blood cells to the presence of bacteria to encourage the cells ability to eliminate the bacterial toxins.

Wang M, Krauss JL, Domon H, et al. *Microbial hijacking of complement-toll-like receptor crosstalk.* Science Signaling. 2010;3:ra11.

Porphymonas gingivalis

- Lives off the breakdown of collagen in the oral cavity
- Bacteria destroys connective tissue by activating a protein degrading enzyme – glutaminylcyclase – aids in protein maturation
- This ushers in the inflammatory diseases such as: RA, COPD, AD
- Blocking the key enzyme could cause starvation of the P. ging pathogen
- Dr. Hans-Ulrich Demuth "active ingredient research"

http://www.sciencedaily.com/releases/2014/10/141009091604.htm accessed 11/17/2014

In 1993 DeStefano, Anda, Kahn, Williamson and Russell researched a link with Cardio Vascular Heart Disease and periodontal diseases and found a mortality risk. These factors were relevant:

- Periodontal diseases
- Calculus
- Biofilm

Severe caries
Periapical lesions
Periocoronitis

…..and now possible links are…

Diabetes Low Birth Weight Babies Respiratory Diseases Rheumatoid Arthritis Obesity

Longitudinal Swedish study n=105,798 – hypothesis: presence of gingivitis/periodontitis in young adults increases the risk of future life-threatening diseases – spanned 16 years. Conclusion: High bacterial load on tooth surfaces and in pockets over prolonged periods may be responsible for diseases, subsequently causing death. **Soder B, Jin LJ, Klinge B, Soder PO. *Periodontitis and Premature Death; a 16-year Longitudinal Study in a Swedish Urban Population.* J Perio Res. 2007;42(40:361-366.**

PD and atherosclerotic CVD: A Consensus **Friedwald, Kornman, Beck, et al. J Perio 2009;80(7):1021-1032**

PD and Obesity **Goodson, Groppo, Halem, Carpino. J Dent Res 2009;99(6):519-523**

Socransky and Haffajee found T. forsythia was higher in sulci of 15, 858 plaque samples of 744 obese patients **Haffajee AD. Socransky SS. J Clin Periodontolgy 2009; 36(2):89-99**

1 in 10 cases of death from pneumonia in nursing home residents may be prevented by improving periodontal health **J AM Geriatric Soc 2008**

16 year study shows posterior teeth most affected in subjects with periodontitis

Soder , Soder, Nowak, Jogestrand. *Early Carotid Atherosclerosis in Subjects with P. D.* Stroke. *2005*

...yet where do we spend most of our time....?

Microorganisms

Kajander and Ciftioglu *Nat. Acad Science* 1998

Nanobacteria : self replicating
bio-film forming
tetracycline sensitive

Song-Mei Zang et al *Journal of Periodontology* 2007

Calcifying Nanoparticles : also known as nanobacteria
found in gingival crevicular fluid
cultured from calculus

Calabrese et al *J Int Acad Perio* 2007

Plaque retentive calculus: red zone pathogens found within
found in lacunae
Td most common microbe

All this to say – we may have underestimated the pathologic potential of calculus (although most of us sensed this all along…)

Calculus

Tan et al *J Clin Perio* 2004

Internal viable bacteria: extensive lacunae
non-mineralized areas containing bacteria
significance in incomplete removal

Knut Selvig *J Perio Research* 2006

Adhesion of organic interbacterial substance: intercrystalline forces
significance of mature accretions in defects
FURCAS

Pattison, A. Dimensions of Dental Hygiene April 2010

Viewed with endoscope, burnished calculus typically found:

base of pocket
developmental depressions
rough CEJ's
FURCATIONS

Classic perio studies show the *impossibility* of removing 100% of the calculus.

Kepic et al. Total calculus removal: an attainable objective? *J Periodontol*. 1990;61:16-20

These studies claim that 50% of the original sub-gingival calculus is left behind after initial (quad) therapy. This illustrates the importance of a tissue check and re-evaluation.

Sherman, et al. The effectiveness of subgingival scaling and root planing. I. Clinical detection of residual calculus. *J Periodontol*. 1990;61:3-8.

Residual calculus goes down to 1% with endoscope use.

Stambaugh et al. Clinical response to scaling and root planing aided by the dental endoscope [abstract]. *J Dent Res.* 2000;79(special issue):2762.

Calculus→Plaque→microbes→endotoxins→genetics/host response→increased CRP

To remain healthy, prevent inflammation!

Outside of endoscope, the best indication of calculus removal is the absence of bleeding.

Even when small spicules of sub are left behind, the microbes within the lacunae will begin to proliferate and re-colonize within hours.

Haffajee AD, Patel M, Socransky SS. Microbiological changes associated with four different periodontal therapies for the treatment of chronic periodontitis. *Oral Microbiol Immunol*. 2008 Apr;23(2):148-57.

Topography of Furcations

Guey-Lin et al *J of Med Sciences* 2003

Dimension of Furca Entrance: comparison
buccal, mesial, distal – max and mand

DoVale et al JADA 2009

Class II Mand Furcas: radiographic evidence of healing
following NS PT on 23 subjects
shorter and narrower furcas - better outcomes

- Risk Susceptibility
  - inherited/acquired
  - smoking/poor oral hygiene
  - specific microflora/DNA
  - stress
- Pocket Depths
- Hard Deposits

Case Reports on Procedures for Class 3 Furcations

Tunneling: allows access for effective OH and maintenance
Successful with short root trunk – where fornix is close to the CEJ
Must be purposeful in pt selection
Pt must be motivated to optimum HC
Other TX options:
Implants – extract teeth - $$$
Bi-sectioning – bicuspidization
GTR – bone grafts for furca closure
Advantages for tunneling:
No need for endo
No need for reconstruction of crown
Little $
Disadvantages:
Root caries/sensitivity potential – (Fl varnish)
Exposure to lateral canals – furca/endo involvement
Requires manual dexterity from pt

J Am Dent Assoc, Vol 133, No 1, 55-60. 2002
The Mandibular Molar Class III Furcation Invasion – A Review of Tx options and a Case Report of Tunneling

Recent study on tunneling: Needleman I. Evid Based Dent 2010;11:39-39
Five year study of effect of SPT in survival rate of multi-rooted teeth with furcations after first being treated with:
Non-surgical: 90%
Surgical: 43-96%
Tunneling: 42-92%
GTR: 83-100%

Detect and Assess Calculus

Matsuda, Pattison. *Dimensions of Dental Hygiene*. 2003;1 (1),2006; 4 (5).

- Perio probing create topographical map
- Use firm lateral pressure
- Correct angulation
- Sharp instruments
- Root morphology
- Correct instruments
- Roughness on any root surface should be regarded as potential calculus

Scaramucci, Mary Kaye. *The Versatility of the Universal Curet*. Dimensions of Dental Hygiene. February, 2010, 32-38.

Treating Furcations

Hodges, Calley. *Dimensions of Dental Hygiene.* January, 2010, 30-35.

- keep tip closed – against the root at all times
- keep against the roof of furcation
- utilize both right and left tips
- mentally visualize the topography

A Comprehensive and Complimentary Approach to Clinical Care

- Apply Critical Thinking
- Constantly re-evaluate
- Bleeding points usually mean residual calculus
  Lang, Adler, Joss , Nyman. Absence of bleeding on probing. An indicator of periodontal stability. *J Clin Periodontol*. November 1990;17(10):714-21.
- Keep US strokes slow and methodical – overlapping "not an irrigator to be used for a quick rinse" (Stach) or for a "drive-by" treatment (Matsuda)
- Keep hand instrument strokes meaningful to avoid burnishing
- Use sharp instruments
- Get rid of expired US tips
- Use combination US and hand instruments – have a wide variety files, hoes
  Specific to furcas
  Quetin furcation curets
  Diamond Files
  Thin US tips – ball-ended furcation tips for biofilm removal only – limited research on efficacy in calculus removal

Stach, Donna. *Furcation Invasion.* Dimensions of DH. Jan, 2011. 42-48.

Ioannou, Dimitriadis, Papadimitriou et al. J Clin Perio 2009;36(2):132-141. Hand Inst vs US deb

Berchier, Slot, Haps, Van der Weijden. The efficacy of dental floss in addition to a toothbrush on plaque and parameters of gingival inflammation: a systematic review. Int J DH 2008; 6(4):26 5-279.

Sodium Hypochlorite

Patients are advised to use an oral irrigator for subgingival application of sodium hypochlorite at a concentration of 0.5%. This is equivalent to 10 mL (2 teaspoonfuls or two thirds of a tablespoon) of 6% household bleach in 125 mL (one half glass) of water.

Slots J. Selection of antimicrobial agents in periodontal therapy. J Periodontal Res. 2002:37;389-398.

Since tooth brushing, flossing and oral rinsing do not reach pathogens residing in furcations and at the depths of deep periodontal pockets, adequate oral hygiene should include subgingival treatment with home irrigators or other appropriate self-care remedies in patients with increased pocket depths. Providine-iodine for professional use and diluted bleach for self-care are inexpensive and valuable antimicrobial agents in periodontal maintenance.

Babay, N, Jorgensen MG, Slots, J., Effective and Affordable Periodontal Maintenance Therapy. JPDA Vol. 10 No. 4 Oct - Dec 2001

Critical Thinking Using the Medical Model

When there is structure loss due to pathogenic, microbial invasion, the body has lost a critical defensive component.

Now we have an open "wound"
(pocket) (FURCA) (caries)
an invasive infection.

Why shouldn't we treat this infected wound using the same logic and communication as our medical colleagues use on other parts of the body?