ETIOLOGY & RISK FACTORS FOR PERIODONTAL DISEASE – LOCAL FACTORS

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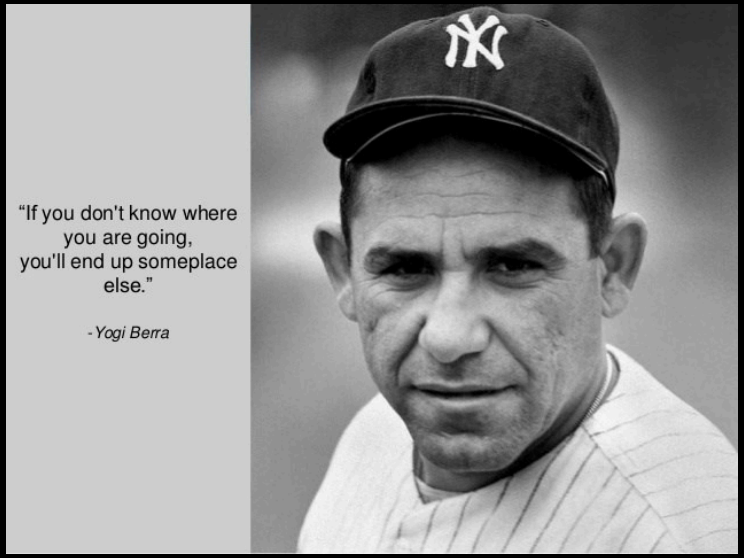
Objectives

- Identify the primary etiologic factor(s) associated with periodontal diseases
- Recognize the role of plaque vs. calculus
- Identify the Local factors, which modify and/or predispose to periodontal disease.
- Recognize the significance of risk factors in the Etiology of Periodontal disease



What Is/are The Primary Cause(s) Of Most Periodontal Diseases

Primary Etiology???

Dental Plaque A.K.A Dental Biofilms
”The Real Slim(e) Shady”

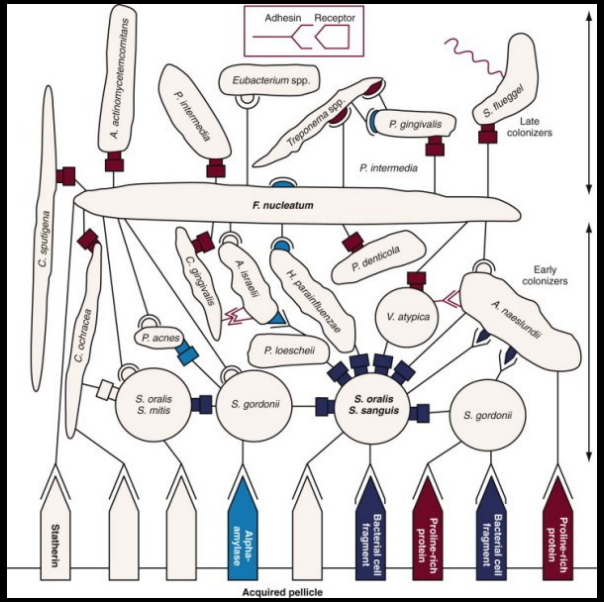
- > 1000 bacterial species in oral biofilms
- < 10% opportunistic putative pathogens??
- > 90% normal oral microbiota or commensals??
- Keystone pathogens **(e.g., *P. gingivalis*, F. *alocis*)**
- **Leads to dysbiosis of biofilm/plaque**

Bacteria are very happy within the mature biofilm

Extracellular slime matrix -inaccessible, resistant to antibiotics, antimicrobial agents and the body's immune response. - how do you get rid of them???

- Need to removed mechanically

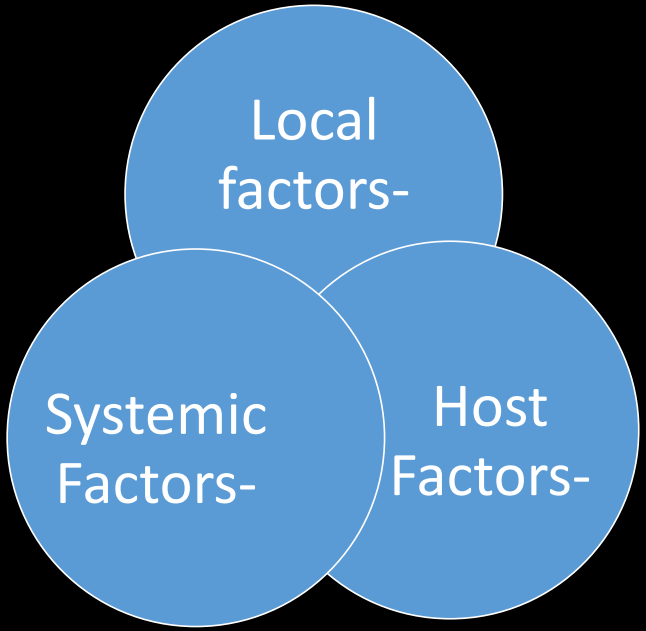
So are biofilms? enough to cause Periodontal disease?



The other major missing piece

- Host Factor or Host Susceptibility

But wait there's more!



(Cariologist's note periodontists can do Venn diagrams too!)

Risk factors for periodontal disease

Periodontitis– A Multifactorial Disease

1. Dysbiotic biofilm containing opportunistic Pathogenic microorganisms/ keystone pathogens
2. Host factors: Genetic /Heredity, epigenetic changes, tooth anatomy, occlusion, congenital conditions, psychological Factors, Habits, Tobacco/Smoking, etc.,
3. **Local factors- plaque, calculus, iatrogenic etc.,**
4. Systemic- Diseases, deficiency etc.,

Inflammatory Periodontal Diseases

- Involve many risk factors/indicators
- **A risk factor influences the occurrence or progression of disease**

Table 4–1 Risk Factors for Periodontal Diseases

- Poor oral hygiene
- Tobacco smoking
- Genetics/heredity
- Stress
- Past history of periodontitis
- Systemic diseases
- Male gender
- Compromised host defense
- Advancing age
- Race, ethnicity
- Regularity of dental care
- Interleukin-1 production

BOX 33-1

Factors to Consider when Determining a Prognosis

Overall Clinical Factors

- Patient age
- Disease severity
- Plaque control
- Patient compliance

Systemic and Environmental Factors

- Smoking
- Systemic disease or condition
- Genetic factors
- Stress

Local Factors

- Plaque and calculus
- Subgingival restorations

Anatomic Factors

- Short, tapered roots
- Cervical enamel projections
- Enamel pearls
- Bifurcation ridges
- Root concavities
- Developmental grooves
- Root proximity
- Furcation involvement
- Tooth mobility

Prosthetic and Restorative Factors

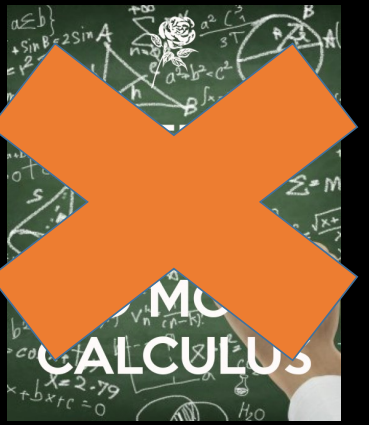
- Abutment selection
- Caries
- Nonvital teeth
- Root resorption

Calculus

- Calculus consists of **mineralized** bacterial plaque that forms on the surfaces of natural teeth and dental prostheses.

mineralized bacterial biofilms

This and Not this



KEEP Calm and REMOVE Calculus!!!

Captain Obvious

Supragingival calculus

- Coronal to the gingival margin
- Usually white or whitish yellow in color; hard, with a claylike consistency;
- Easily detached from the tooth surface- may rapidly recur, especially in the lingual area of the mandibular incisors
- May localize on a single tooth or group of teeth, or it may be generalized throughout the mouth.

Subgingival calculus

- Located below the crest of the marginal gingiva.
- Location and extent of subgingival calculus evaluated by careful tactile perception with a delicate dental instrument - explorer. (11/12 explorer)
- Darker in color, more adherent and often difficult to remove.
- If recession, reclassified as supra gingival

helps disease progress

Etiological significance of calculus

- Calculus **does not** contribute **directly** to gingival inflammation,
- Provides fixed nidus for continued accumulation of plaque
- Subgingival calculus likely product rather than cause of periodontal pockets.
- While plaque is main etiologic factor for periodontitis
  - **removal of subgingival plaque and calculus is cornerstone of periodontal therapy.**
- Calculus maintains & accentuates periodontal disease
  - Keeps plaque in close contact with gingival tissue
  - Creates areas where plaque removal is impossible.

causes the disease

plaque retentive

Four modes of Calculus attachment

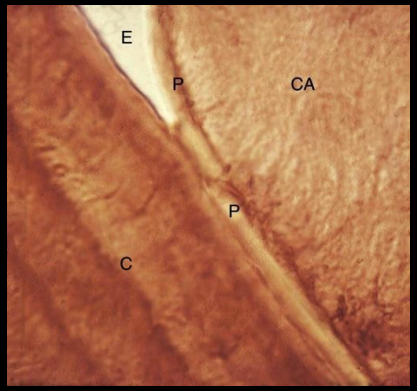
A. Attachment by means of an organic pellicle on cementum

B. Attachment on enamel

C. Mechanical locking into surface irregularities, such as caries lesions or resorption lacunae

D. Close adaptation of the undersurface of calculus to depressions or gently sloping mounds of the unaltered cementum surface and the penetration of bacterial calculus into cementum

A



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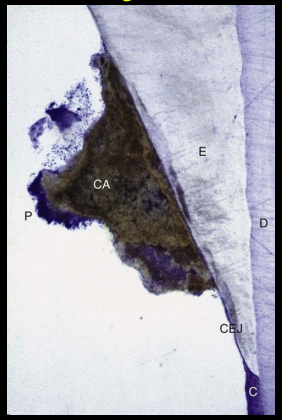

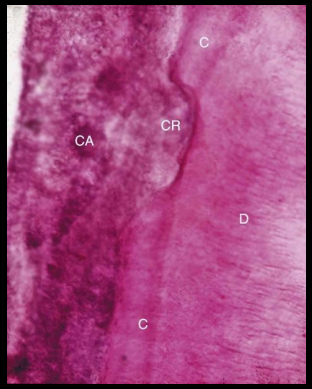

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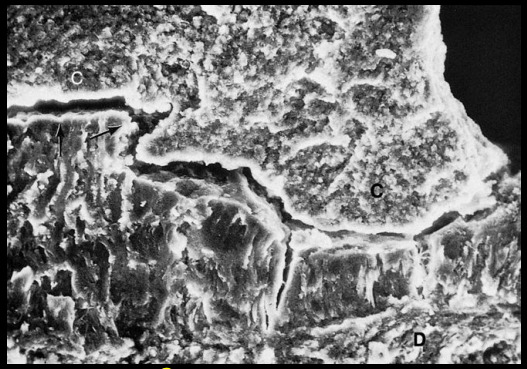


D

Calculus

Calculus

wing like projections

if not mineralized, feel it tactilely

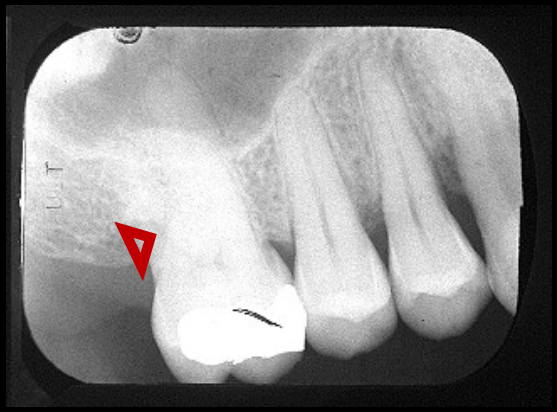
Calculus

A 31-year-old white man with extensive supragingival and subgingival calculus deposits

B, One year after thorough scaling and root planing to remove supragingival and subgingival calculus deposits, followed by restorative care. Note : substantial reduction in gingival inflammation.

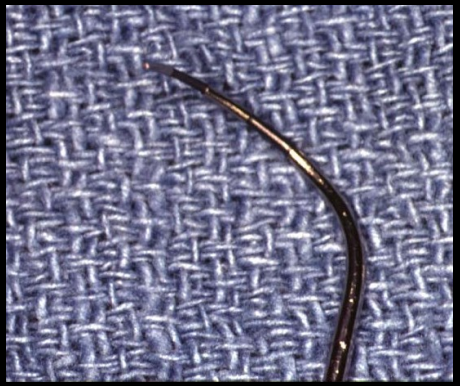
Team work

Furcation Involvement

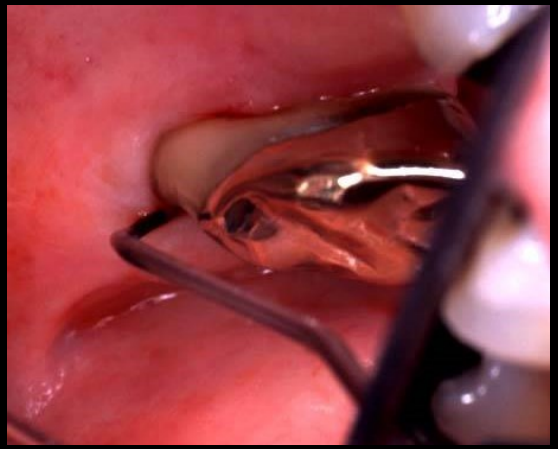


▷ furcation arrow
need to check clinically

Nabers Probe



mx → furcation palate



Root concavities

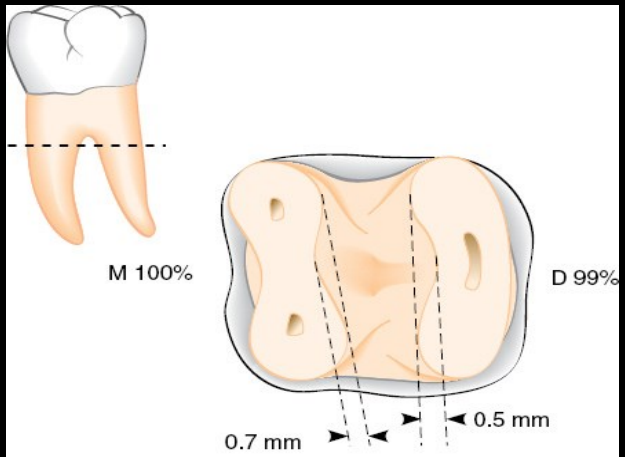


Figure 33-7 Root concavities in mandibular first molars sectioned 2 mm apical to the furca. Concavity of the furcal aspect was found in 100% of mesial *(M)* roots and 99% of distal *(D)* roots. Deeper concavity was found in the mesial roots (mean concavity, 0.7 mm).

(Redrawn from Bower RC: J Periodontol *50:366, 1979.)*

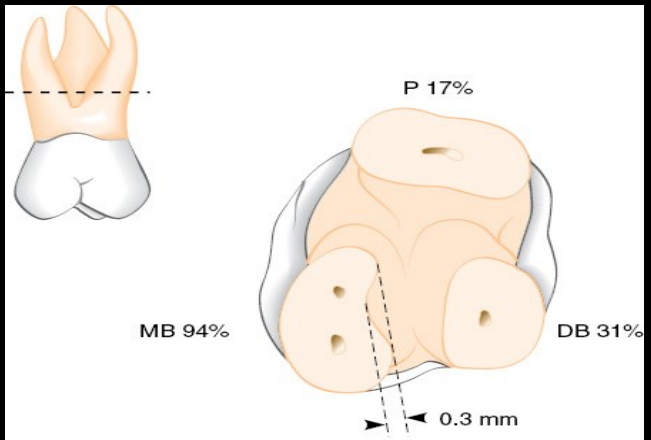
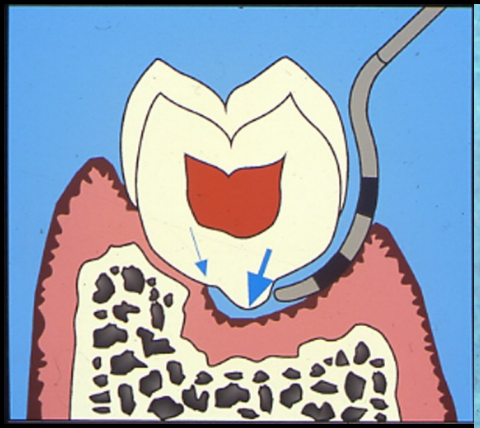


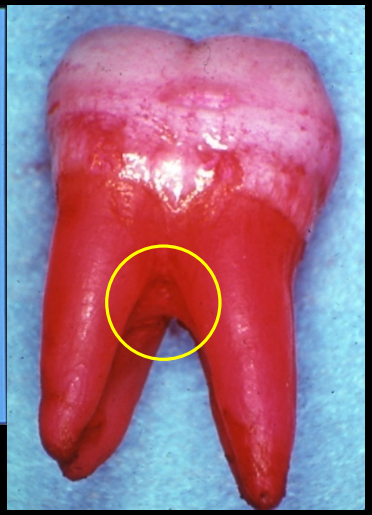
Figure 33-6 Root concavities in maxillary first molars sectioned 2 mm apical to the furca. The furcal aspect of the root is concave in 94% of the mesiobuccal *(MB)* roots, 31% of the distobuccal *(DB)* roots, and 17% of the palatal *(P)* roots. The deepest concavity is found in the furcal aspects of the mesiobuccal root (mean concavity, 0.3 mm). The furcal aspect of the buccal roots diverges toward the palate in 97% of teeth (mean divergence, 22 degrees).

(Redrawn from Bower RC: J Periodontol *50:366, 1979.)*

Intermediate Bifurcational Ridges

- Interfere w/ measuring horizontal attachment loss
- Prevent thorough instrumentation
- With a “tunneling” procedure , plaque removal is difficult





Intermediate Bifurcational Ridges

- Not as distinct in maxillary trifurcations
- Ridges formed mostly on cementum

Everett FG, et al. J Dent Res 1958, 37:162

Dunlap RM, Gher ME. J Periodontol 1985, 56:234

External Bifurcation Ridges

- Located at the furca entrance
- Found in 63% of mandibular molars

Everett FG, et al. J Dent Res 1958. 37:162

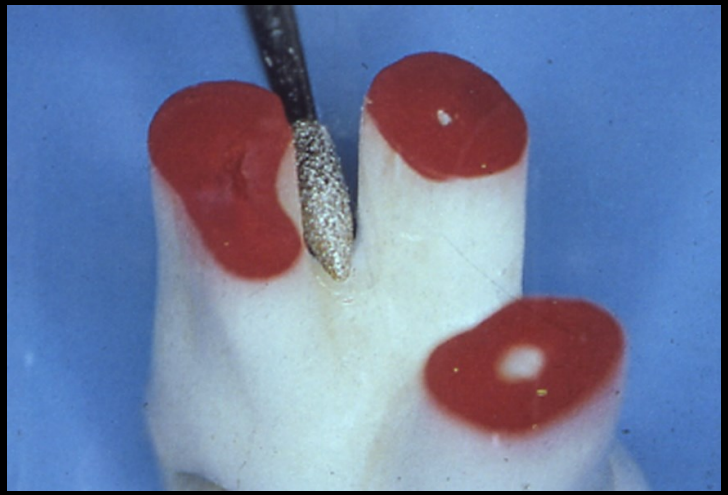
- Presence can result in furcation roof located more coronal to the entrance

Dunlap RM, Gher ME. J Periodontol 1985. 56:234

most furcation entrance & attachment loss

- In 11 of 20 maxillary molars, the furcation entrance was apical to the roof.

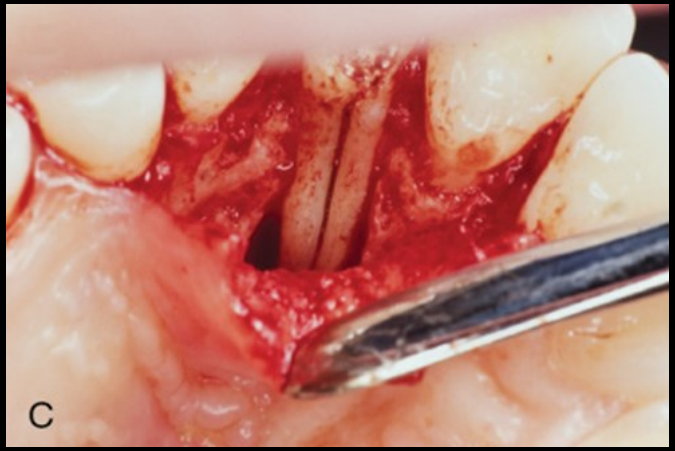
Gher ME, Dunlap RM. J Periodontol 1985. 56:39



Developmental grooves

Figure 33-8A Palatogingival groove. **A,** Probe in place to indicate a deep pocket along the palatogingival groove. **B,** Radiograph with a gutta percha point placed in the pocket. **C,** The area is surgically opened. Note the palatogingival groove along the entire palatal portion of the root.

(Courtesy of Dr. Nadia Chugal, University of California, Los Angeles.)

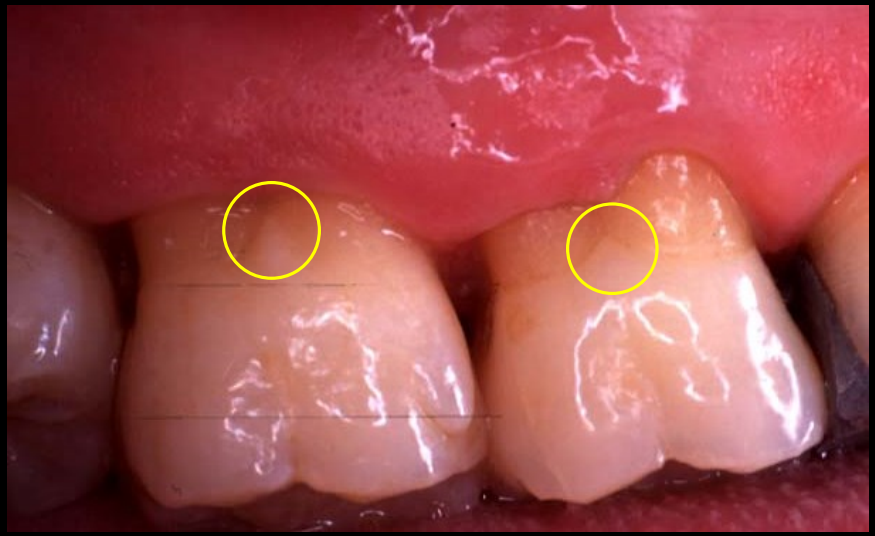


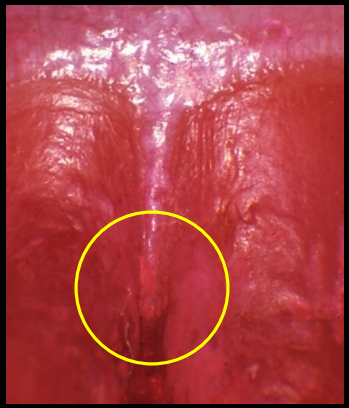
Examples of Palatogingival Grooves

Example of A Treated PGG- 29 Year Follow-Up

Case Courtesy of Dr. Tom Kepic

Cervical Enamel Projections

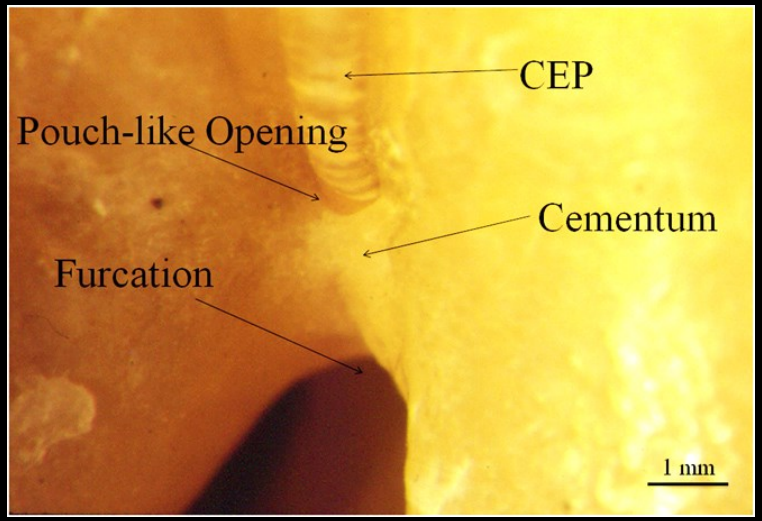




90% of isolated mandibular molar furcation defects were related to CEPs

Masters DH, Hoskins SW. J Periodontol 1964. 35:49

CEP



Blanchard SB, Derderian GM, Averitt TR, John V, Newell DH. Cervical enamel projections and associated pouch-like opening in mandibular furcations. J Periodontol. 2012 Feb;83(2):198-203. Epub 2011 Jun 21. PubMed PMID: 21692630.

Cervical Enamel Projections

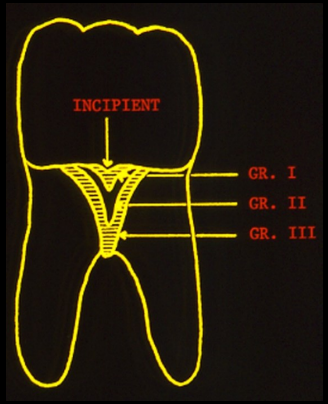
Classification of Cervical Enamel Projections

Grade I: The enamel projection extends from the cementoenamel junction of the tooth toward the furcation entrance.

Grade II: The enamel projection approaches the entrance to the furcation. It does not enter the furcation, therefore there is no horizontal component.

Grade III: The enamel project actually extends horizontally into the furcation.

Masters DH, Hoskins SW: Projection of cervical enamel into molar furcations. J Periodontol 1964; 35:49.



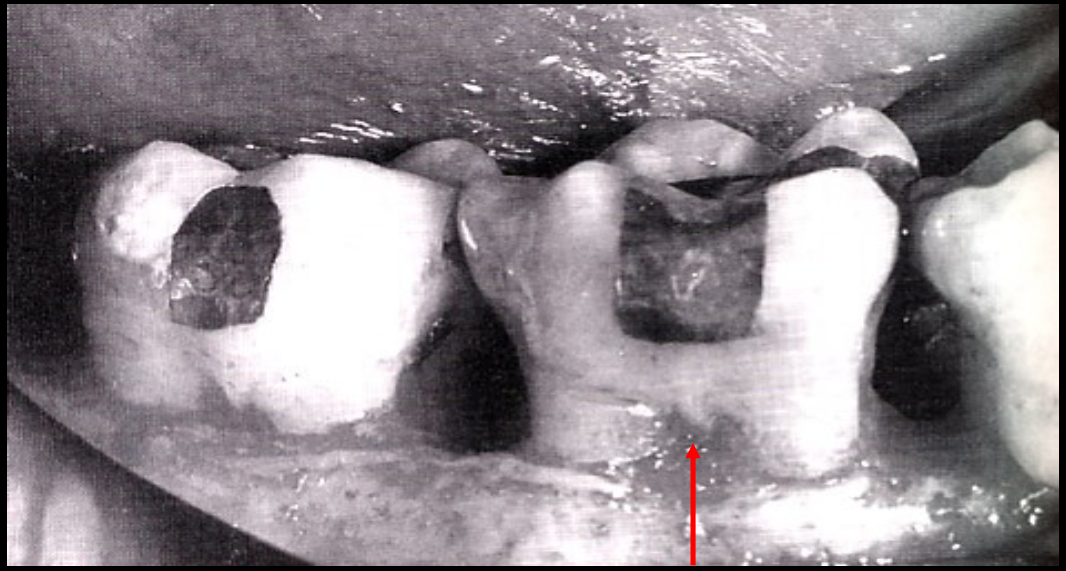
Cervical Enamel Projections

No significant relationship between skull furcation lesions and the presence of Grade I, II and III CEPs.

50% increase in prevalence of FI when only Grade II and III CEPs were considered.

Swan RH, Hurt WC. Cervical enamel projections as an etiologic factor in furcation involvement. J Am Dent Assoc 1976. 93:342-345

Grade 3 CEP



Enamel Pearl

Dan Holtzclaw, DDS, MS August 2010, Journal of Implant and Advanced Clinical Dentistry

Plunger Cusp

In Occlusion

forces food downward

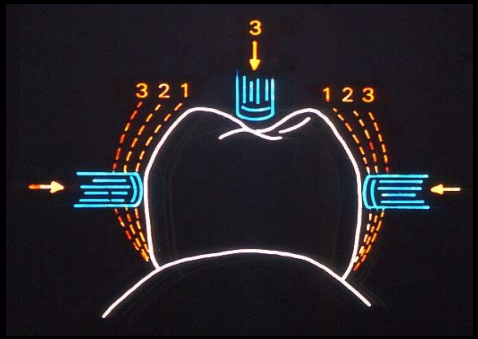
Intra-Surgical

Note: Marginal ridge discrepancy

Dan Holtzclaw, DDS, MS August 2010, Journal of Implant and Advanced Clinical Dentistry

Local Factors

- Subgingival restorations; Marginal discrepancies
  - Plaque accumulation, increased inflammation---- bone loss
- **Tooth Mobility**
  - Mobility lowers response to therapy
  - Ability to restore stability is inversely proportional to mobility caused by loss of supporting bone.
  - Ideal plaque control may result in equal healing for hyper mobile teeth and firm teeth



Classification of mobility (review)

Miller Classification

Class 1: mobility that is more than physiologic but less than 1mm in the bucco-lingual direction

Class 2: mobility that is 1mm or more in the bucco-lingual direction

Class 3: mobility that is 1mm or more in the bucco-lingual direction, and also depressible, i.e. apico-coronal movement.

More practical guidelines

Class 1: some discernable B-L mobility beyond physiologic (I feel physiologic is probably difficult/impossible to visualize clinically)

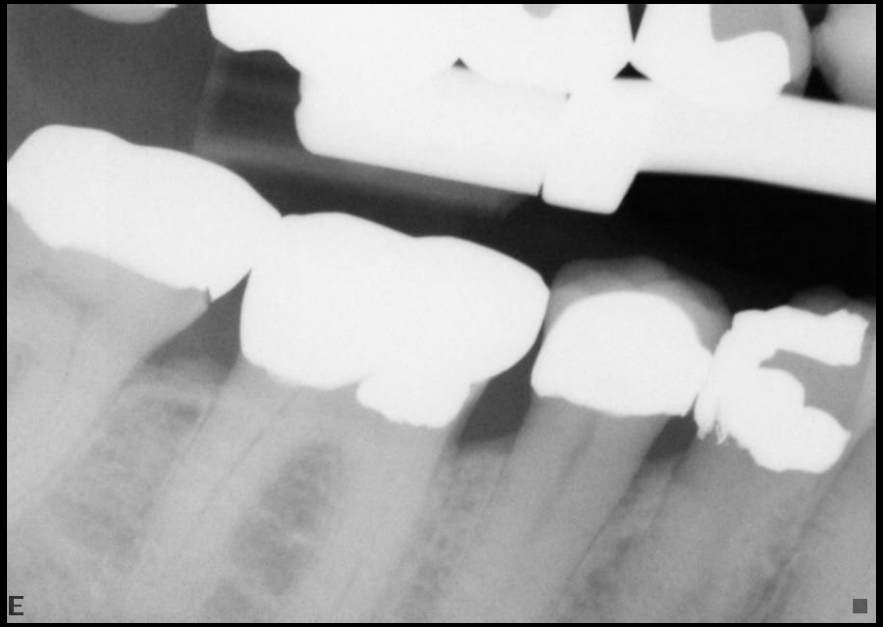
Class 2: Somewhere in between Class 1 and 3

Class 3: greater than or equal to 2 mm and/or depressible in the socke

Restorative Factors/Iatrogenic factors

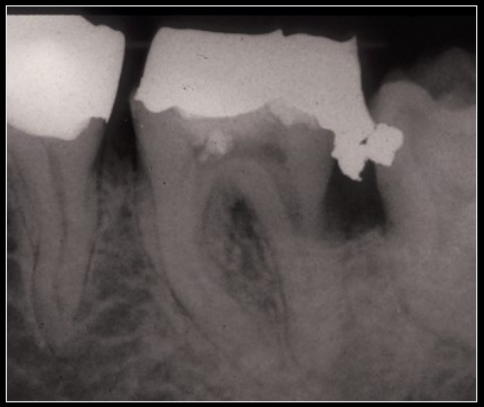
- Overhanging margins
- Open proximal contacts
- Open margins
- Over contoured restorations.

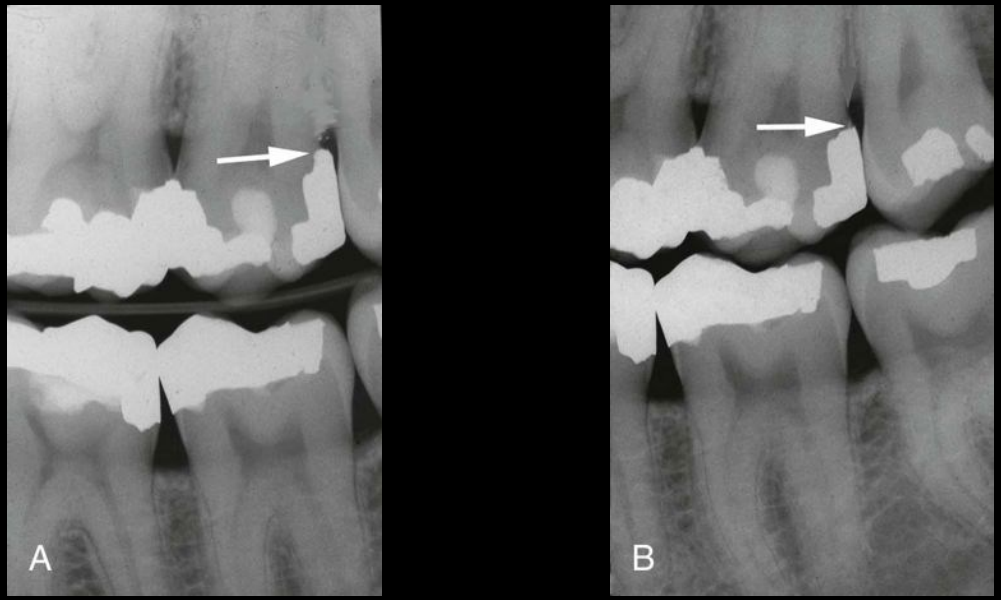
Restorative Factors



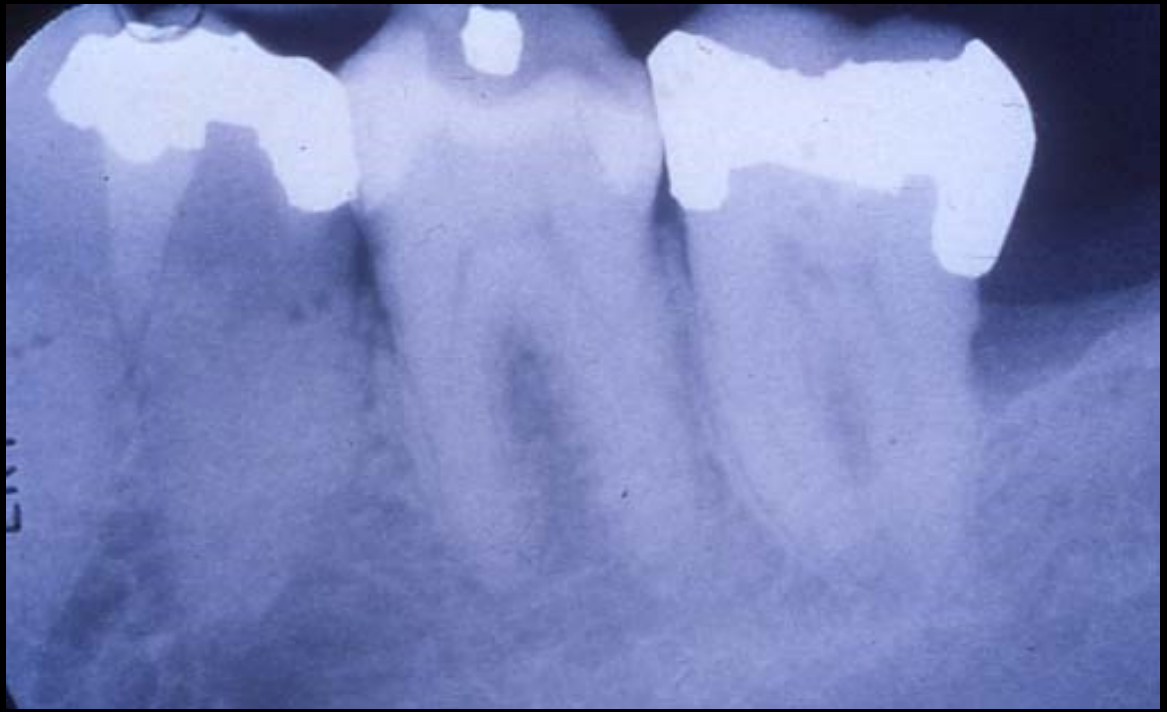
LOCAL FACTORS – Iatrogenic

- over contoured restorations
- overhangs,
- rough margins
- open contacts

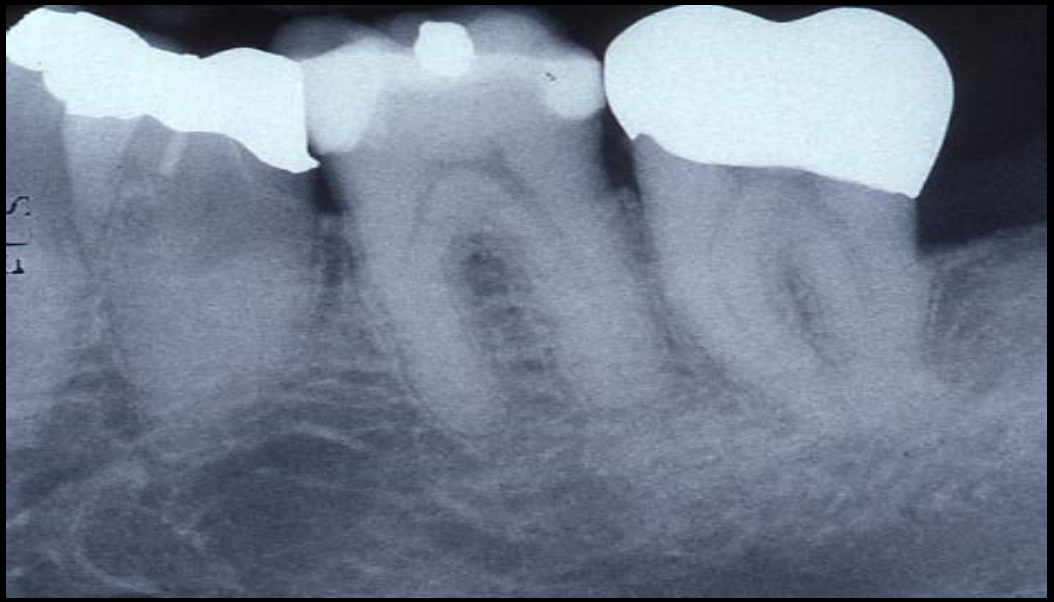


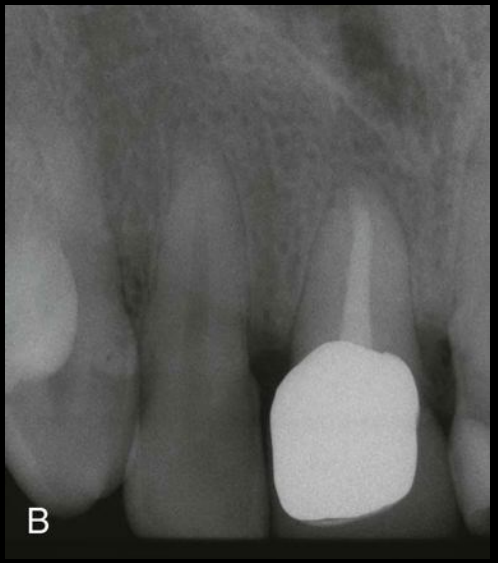


A, Radiograph of an amalgam overhang on the distal surface of the maxillary second molar that is a source of plaque retention and gingival irritation. B, Radiograph that depicts the removal of excessive amalgam.

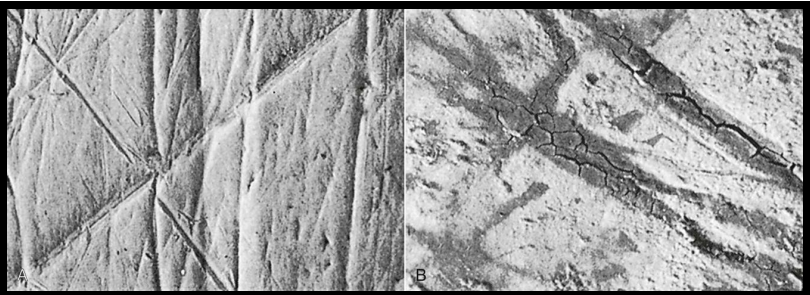


Following Guided Tissue Regeneration and restorative treatment

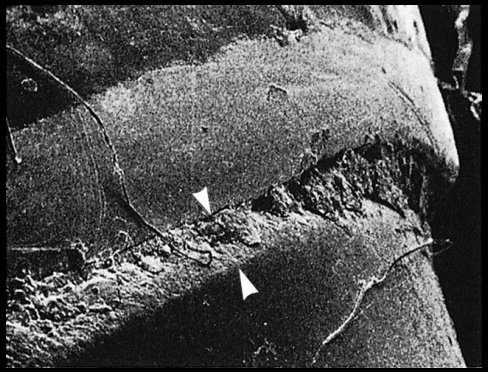




A, Inflamed marginal and papillary gingiva adjacent to an overcontoured porcelain-fused-to-metal crown on the maxillary left central. B, Radiograph of an ill-fitting porcelain-fused-to-metal crown.



A, Polished gold alloy crown demonstrating surface scratches. B, Scratched several year old Gold alloy filled with deposit



After cementation, luting material prevents the approximation of the crown margin and the finishing line, thereby leaving part of the prepared tooth uncovered (area between arrowheads).

A void has developed after the dissolution and disintegration of the luting material. Spherical bodies are not identified. C, Crown; R, root.

LOCAL FACTORS – Iatrogenic

ORTHODONTIC Appliances are plaque-retentive

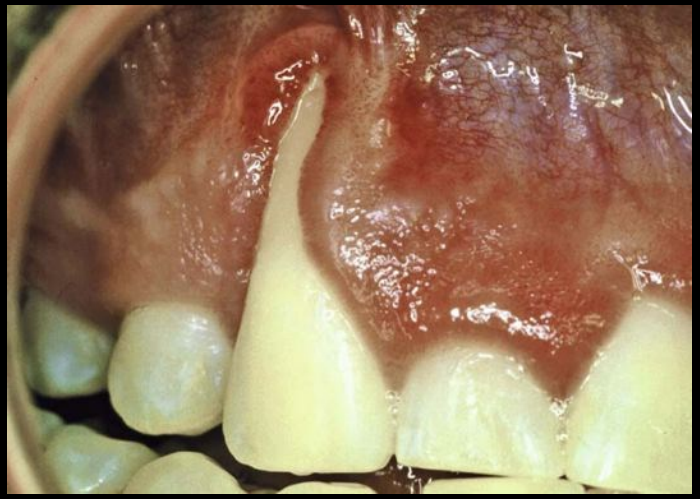
Can lead to recession years later!

LOCAL FACTORS – Tooth Position

MAL-ALIGNED TEETH – Crowding, tilting

May promote plaque accumulation and food impaction

Physical trauma



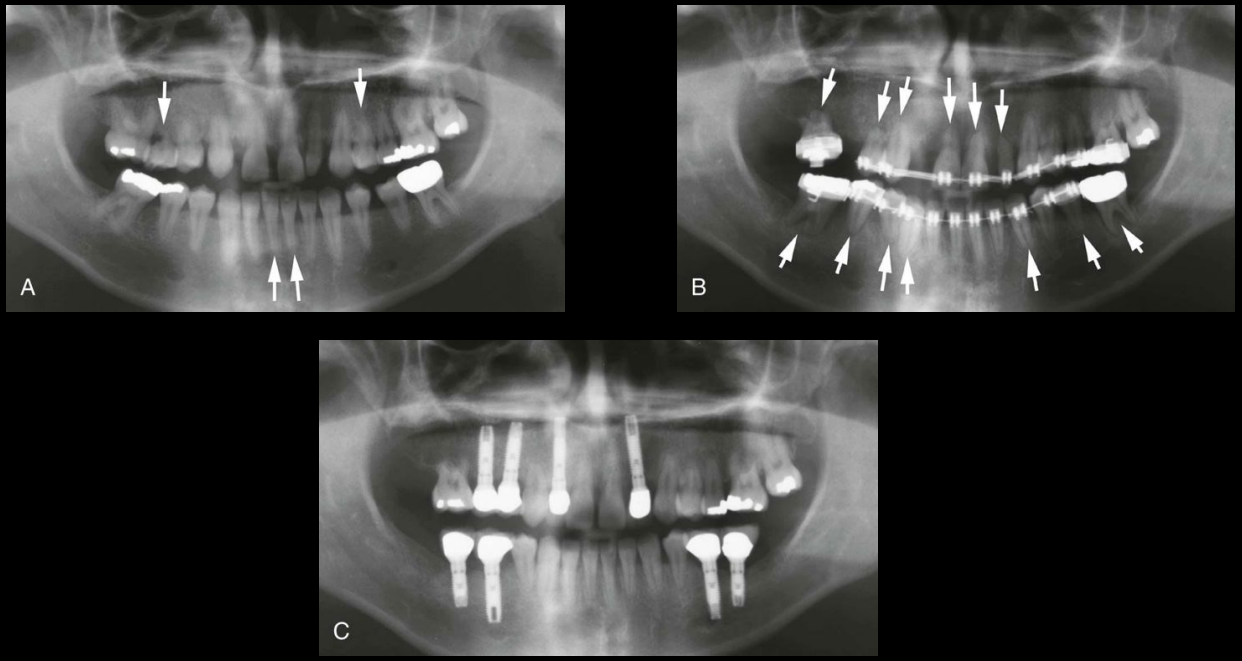
Gingival recession on a maxillary canine caused by self-inflicted trauma from the patient's fingernail.

The overzealous use of a toothbrush resulted in denudation of the gingival epithelial surface and exposure of the underlying connective tissue as a painful ulcer.

A, Tongue pierced with oral jewelry. B, Probing depth of 8 mm with 10 mm of clinical attachment loss on the lingual surface of the lower central incisor adjacent to the oral jewelry in the pierced tongue. The central incisor was found to be vital. C, Bone loss associated with a tongue pierced by oral jewelry.

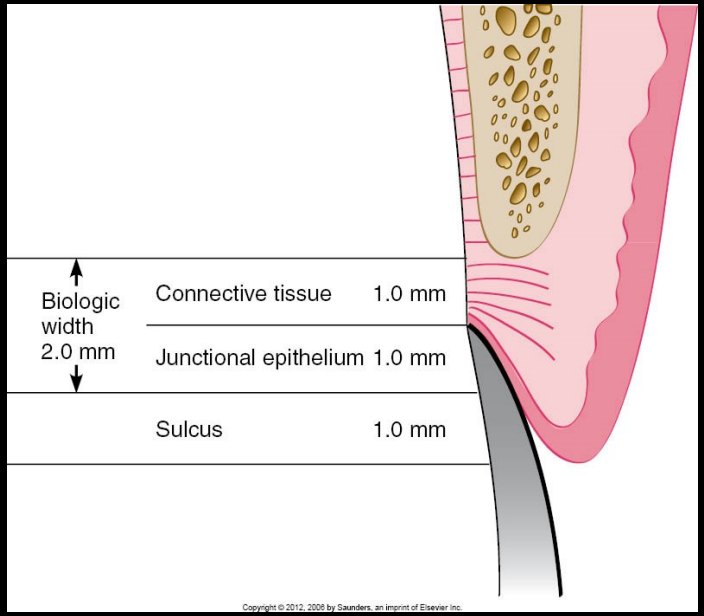
Other factors

- Caries, and root resorption
- Idiopathic/orthodontic root resorption
- Biologic width/ supra crestal attachment violations



A, Panoramic radiograph illustrating that a limited degree of pretreatment root resorption (arrows) existed before orthodontic care. B, Note that several roots have undergone severe resorption (arrows) during 4 years of intermittent orthodontic treatment. C, Note that the teeth that developed extensive root resorption with accompanying hypermobility have been extracted and replaced with implant-supported crowns.

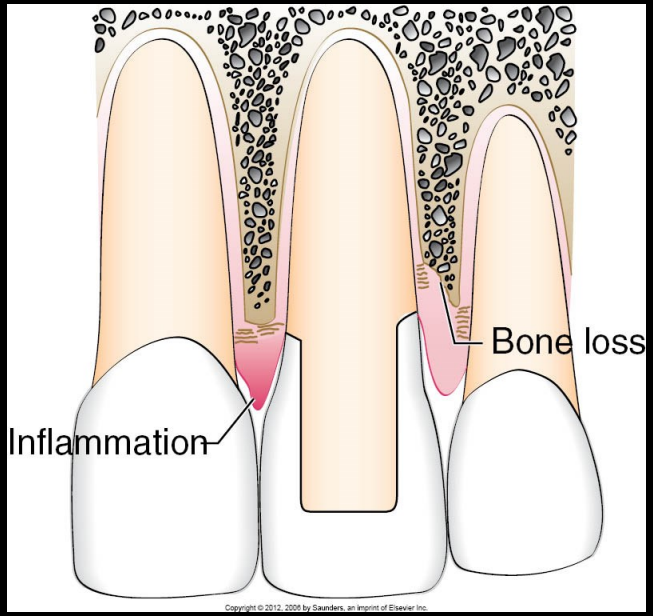
What is Supracrestal attachment? (Biologic Width)



Calculate ~~Biologic Width~~ Supracrestal attachment

- Bone sounding
  - Local anesthesia, insert sterile probe in sulcus ad push through the attachment to bone.
  - Record measurement from GM
- Subtract sulcus depth from above measurement
- Repeat on several teeth

If biologic width is violated:



Acknowledgements




Dedicated to Late Dr. Donald Newell.

Bonus Material

not part of the session objectives/ not required reading for this session

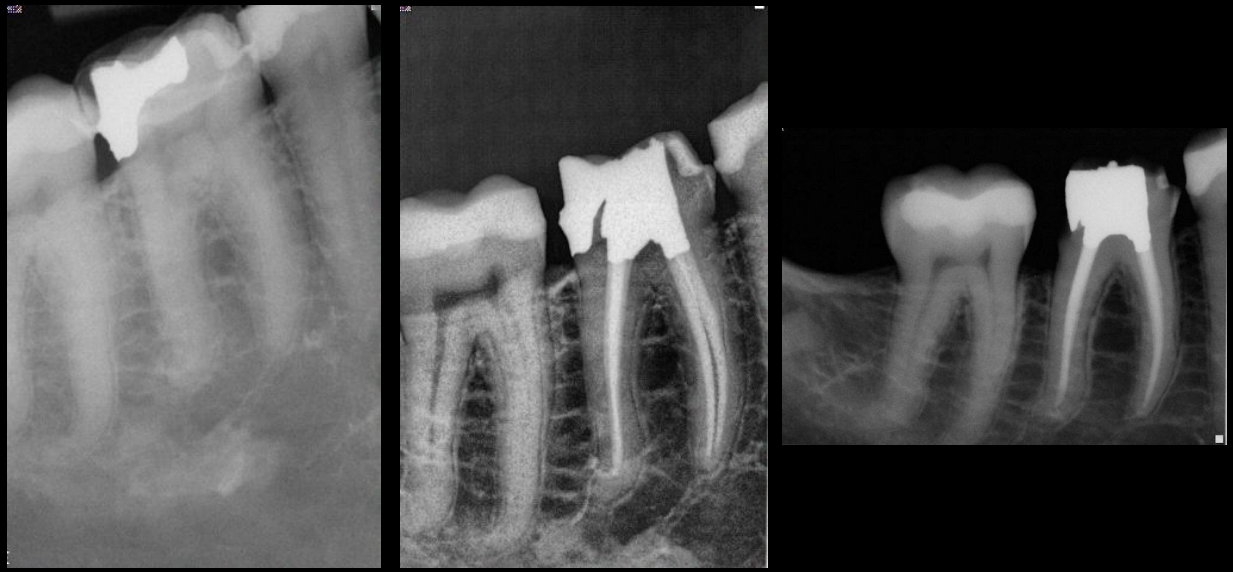
Clinical factors

- Esthetics
- Clinical root length
- Root proximity
- Furcation location
- Individual tooth position
- Restorability of the tooth

Cohen, M Interdisciplinary treatment planning. 2008 14: 433-458

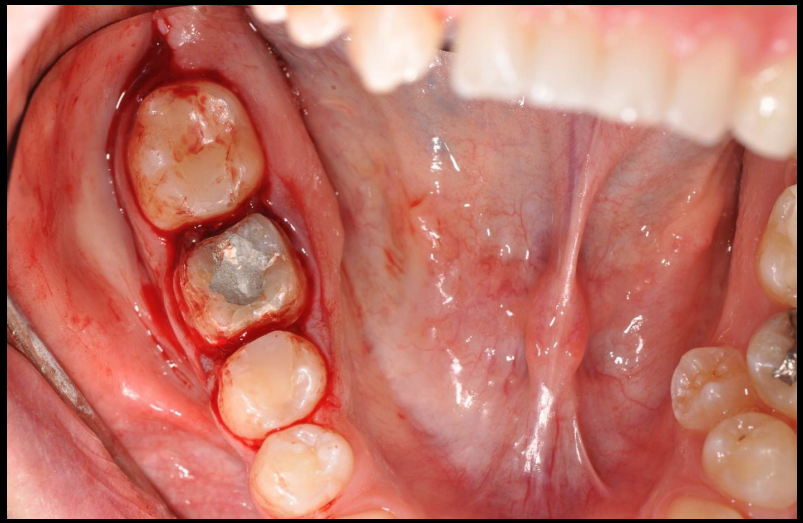
Functional Crown Lengthening

Dr. Matthew Rowe, DDS IUSD Periodontics Resident



Dr. Matthew Rowe, DDS IUSD Periodontics Resident, 2013

Functional Crown Lengthening



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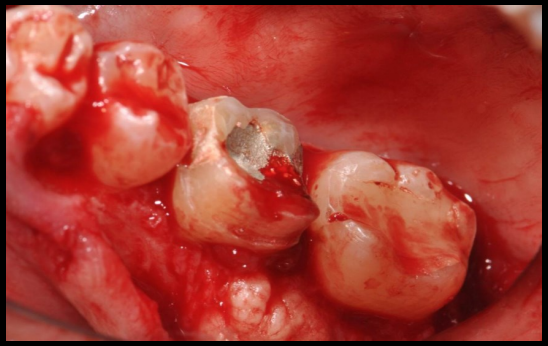
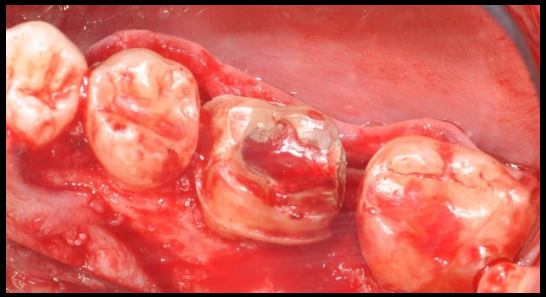
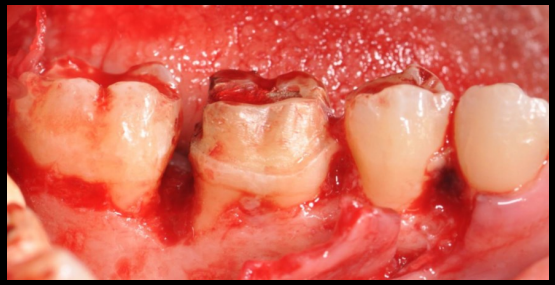
Functional Crown Lengthening







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