Periodontics for the General Dentist

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TO GET THE MOST FROM THIS PRESENTATION

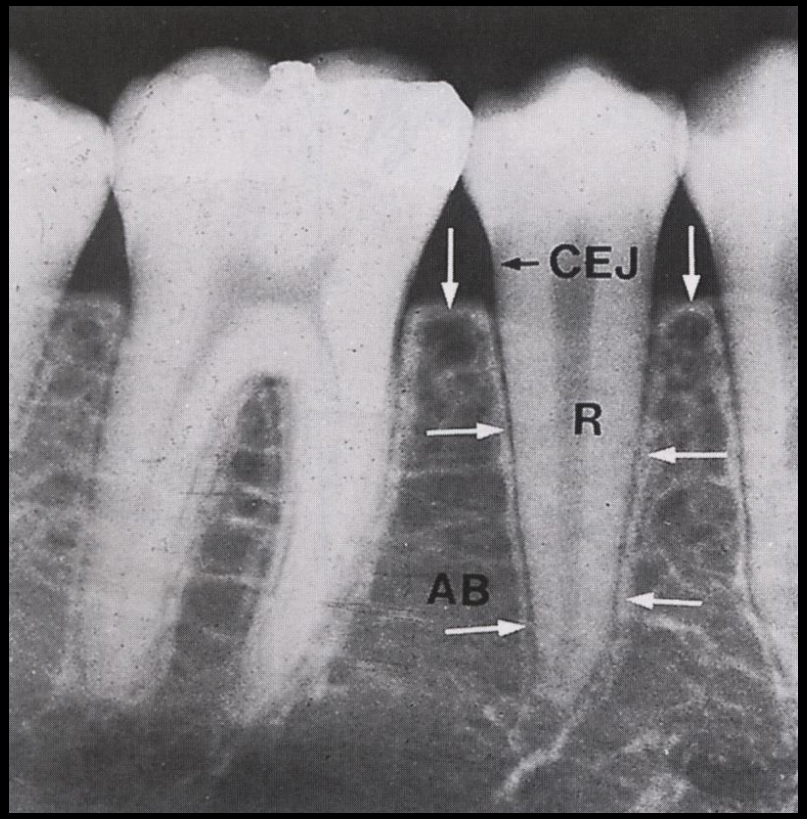
- Listen with Intention- It is NO coincidence that you are here
- Be Open to Learning New Information
- Have fun learning!
- Please keep cell phones muted, and please ask questions during Q&A or during break time

Objectives

- Being able to understand the importance of non-surgical & surgical therapy
- Understanding the difference between resection & regenerative therapy regarding periodontal therapy
- Understanding what anatomical contributing factors can lead to periodontitis
- Relationship between restorative therapy & periodontitis
- What factors decide on when to “save or not to save” teeth & implant therapy

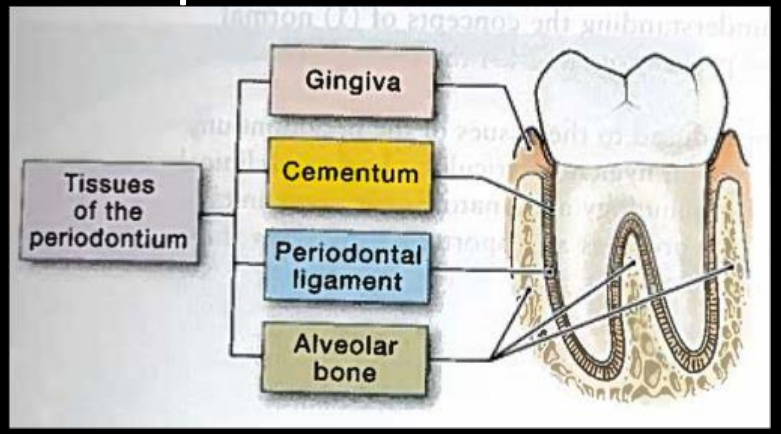
Introduction

Anatomy and function of the normal healthy adult periodontium



Periodontium

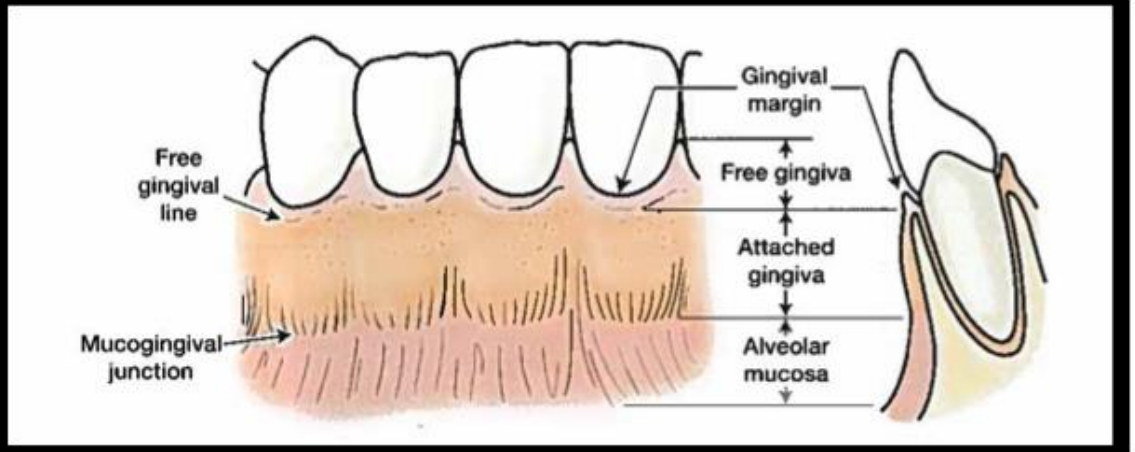
- The tissues of the periodontium comprise of 4 main structures:

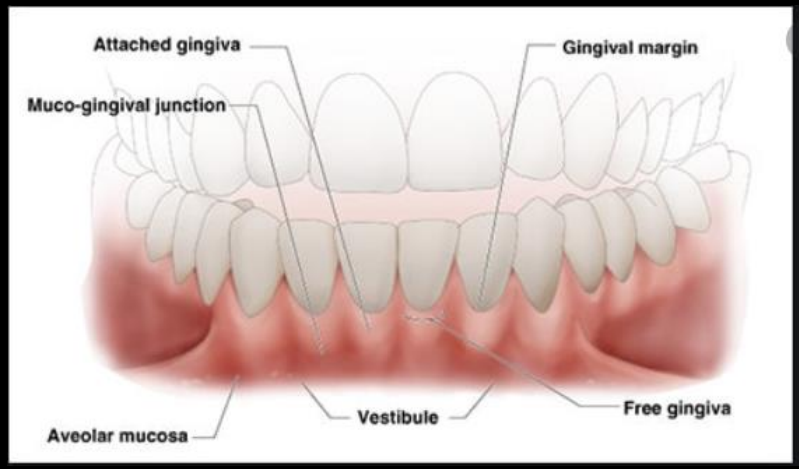


1. Gingiva
2. Cementum
3. Periodontal Ligament (PDL)
4. Alveolar Bone- consists of cortical bone, cancellous bone & alveolar bone proper which lines the socket

- These supporting tissues of the teeth are the attachment apparatus

Gingival Complex





- Acronym FAM: Free gingiva, Attached gingiva & Mucogingival Junction
- Gingival unit has coronal portion (towards tip of the tooth) which includes the gingival margin & the apical portion (towards the root) boundary which comprises the alveolar mucosa
- The lack of both free gingiva & attached gingiva can cause a problem in the patient's gingival health and ~ 2mm is considered healthy

Attached Gingiva

Health

Lack of KT

- AG protects the gingiva against mechanical forces & it being separated from the tooth

- It lacks elastic fibers and is firmly bound down, hence it is different from the free gingiva and oral mucosa which are movable

Attached Gingiva

Health

Color: Pale/ coral pink

Color: Pigmentation

- Light Brown - Black
- More frequent in dark skinned individuals
- Not necessarily a sign of pathology (not melanoma!)

Attached gingiva

- Serio et al. state that the widest zone of gingiva is in the maxillary anterior region, narrowest zone is at the facial aspect of the mandibular first premolar
- Per Bowers et al. facial gingival width can vary b/w 1-9 mm
- Controversy on the minimum amount of keratinized attached tissue need to maintain gingival health

Lack of soft and hard tissue

Health

Indications for perio surgery?

- Deep pockets after initial non-surgical therapy, PD > 5mm. Resection vs Regeneration
- Lack of KT with abherrent frenum
- Severe recession causing patient discomfort or esthetic issues, mucogingival deformities
- Teeth that have a hopeless prognosis, need ext.
- Implant placement if needed
- Excessive soft tissue growth, preprosthetic surgery

Resection vs Regenerative

Resection

- Osseous surgery involves the usage of resective procedures warranting Osteoplasty and Ostectomy . Subtractive procedure
- Involves the surgical removal of the gingiva & reshaping the bone to eliminate the pocket and correct bone architecture
- Essentially a modification of the bony support of the teeth, not done in anterior teeth

Instruments

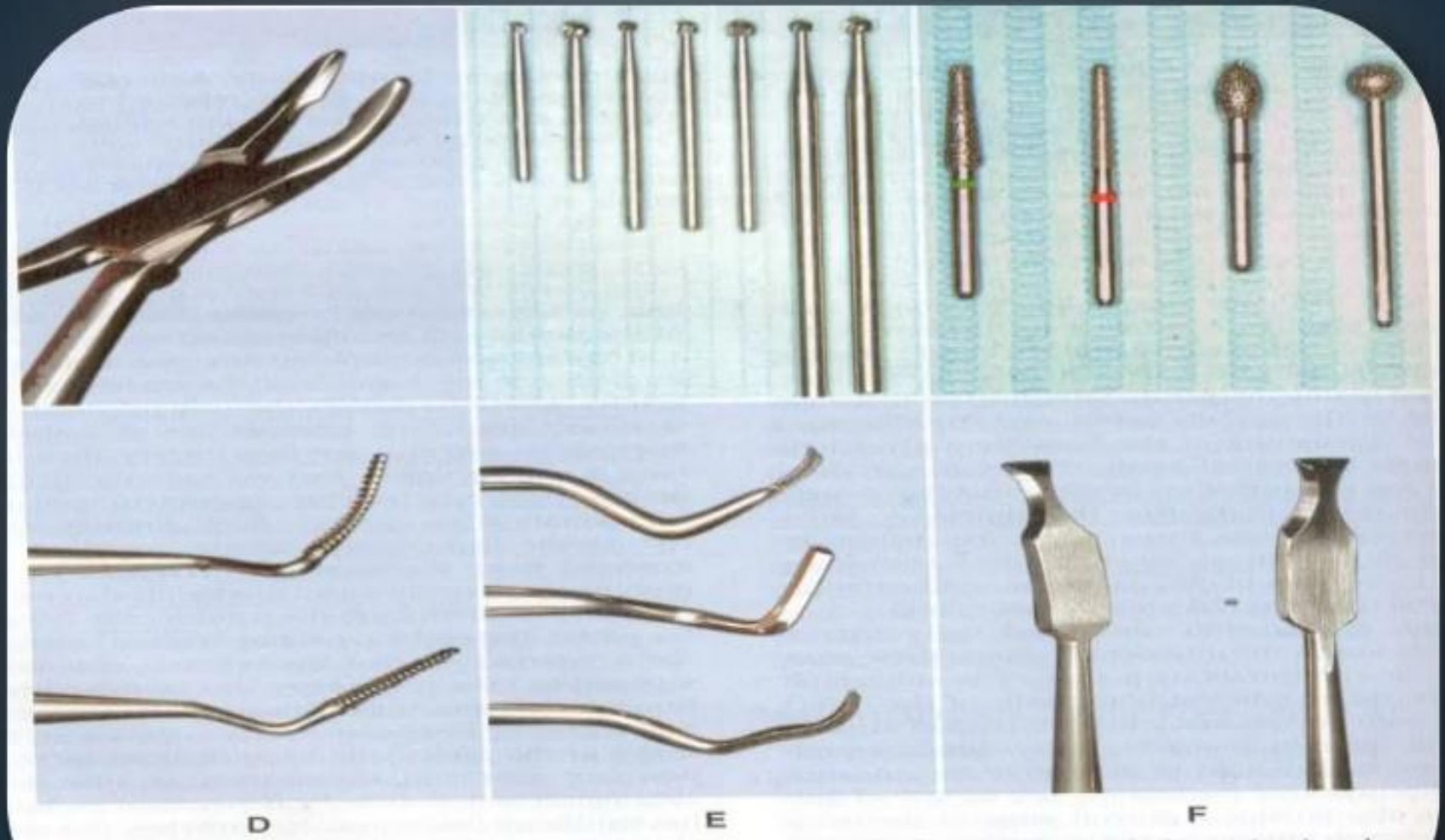
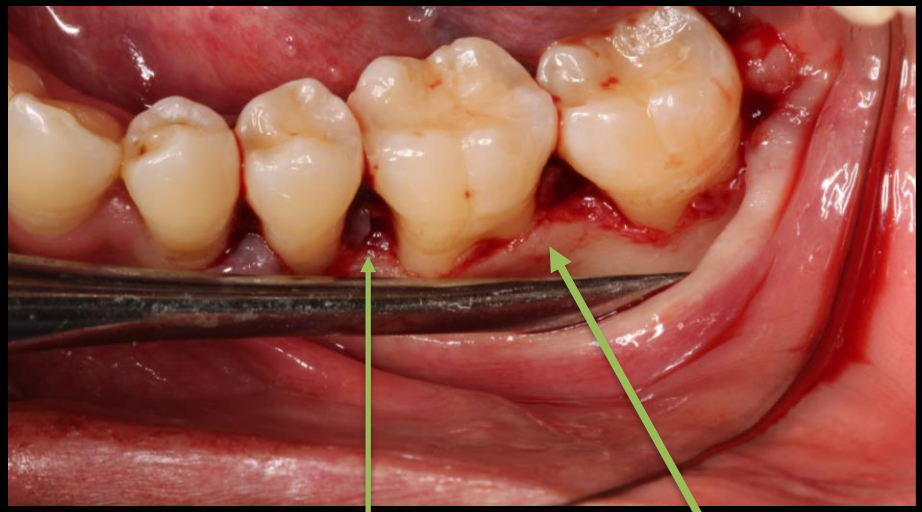


Figure 66-8 Instruments often used in osseous surgery. **A,** Rongeurs: Friedman *(top)* and 90-degree Blumenthal *(bottom)*. **B,** Carbide round burs. *Left to right,* Friction grip, surgical-length friction grip, and slow-speed handpiece. **C,** Diamond burs. **D,** Interproximal files: Schluger and Sugarman. **E,** Back-action chisels. **F,** Ochsenbein chisels.

Resective surgery

Deep perio pockets seen on lower quad, with extreme bleeding upon probing

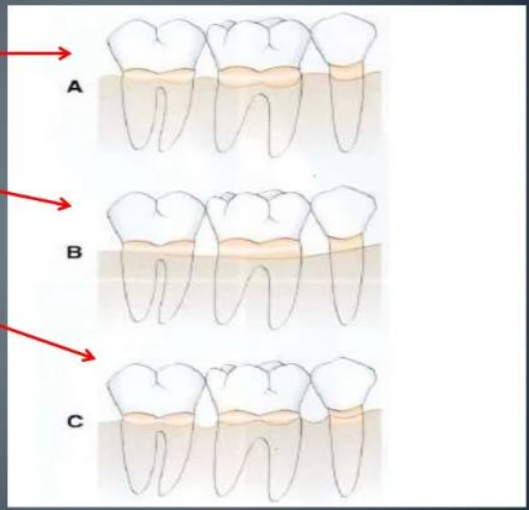


Granulation tissue

Ledges “ Widows peak”

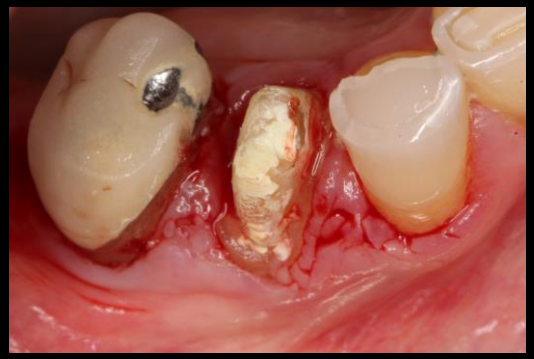
Compromise needs to be made, if interproximal reduction one aggressively, then poor crown to root ratio can be seen compromising long term tooth structure

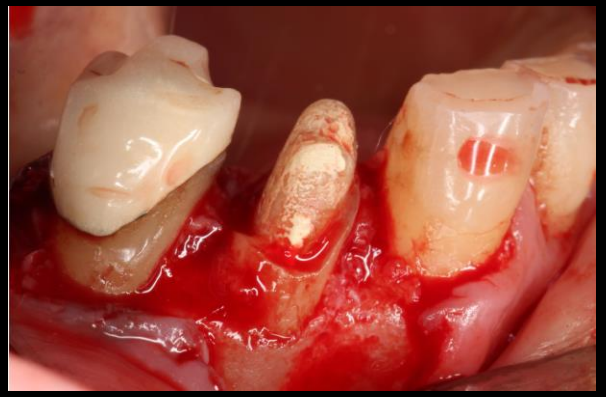
- Architecture :
  - Positive
  - Flat
  - Reverse / negative
  - Ideal

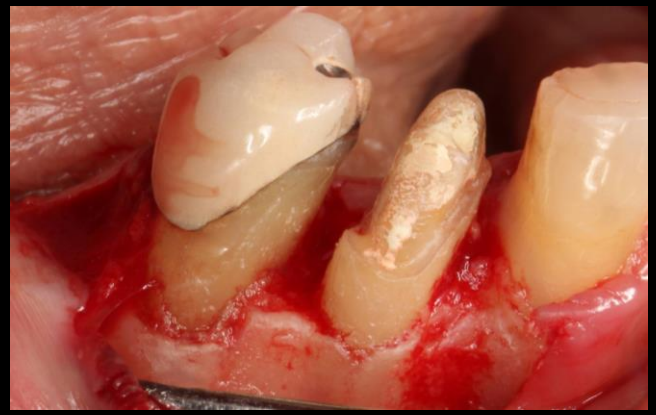


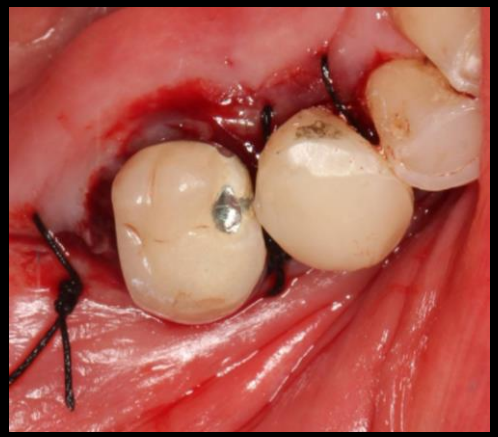
Functional Crown lengthening

Crown lengthening is a form of resective surgery : removal of both soft &hard tissue, always apically position flap









Post operative ~1 month

- 6-8 weeks recommend for final impression-Post, 4-6 months-Anterior
- Recession on adjacent teeth can occur during healing (need to wait)
- Make sure that the patient understands prior to sending patient to periodontist, communicate with your specialist

Regeneration

- Additive procedure, involves usage of materials such as bone graft, GTR or biologics
- Regeneration requires the formation of structures such as cementum, PDL & bone
- Extremely technique sensitive procedure, and it is used for correction of vertical defects

* The term infrabony was later expanded to designate all vertical defects.

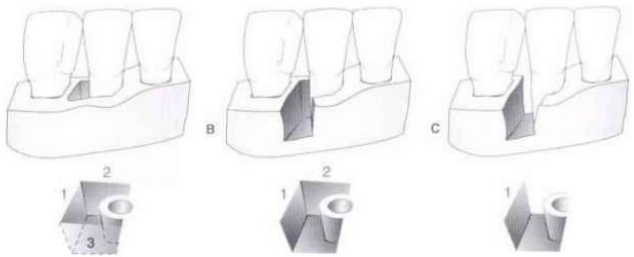
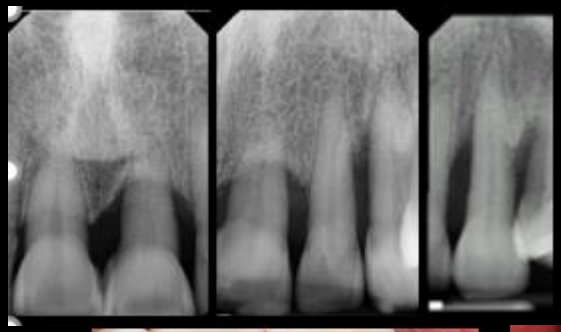


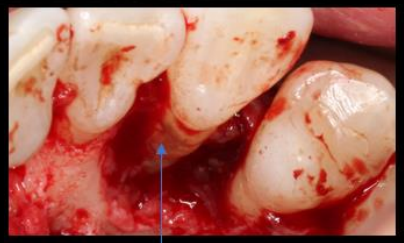
Fig. 23-15 One-, two-, and three-walled vertical defects on right lateral incisor. A, Three bony walls: distal (1), lingual (2), and facial (3). B, Two-wall defec
distal (1) and lingual (2). C, One wall defect: distal wall only (1).

Regenerative Case

"I have had multiple cleanings and I don't know why I still have deep pockets; my gums look healthy so what is going on?"

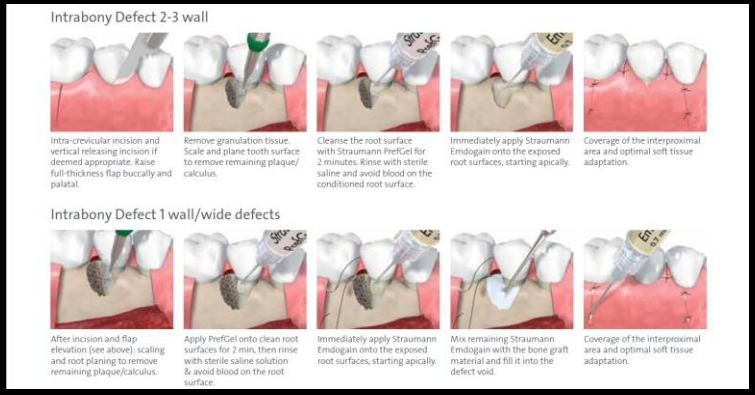


B B		B B	BdS
2 2 6	5 3 4	106 5	CAL
0 0 0	0 0 0	0 2 0	CEJ-GM
2 2 6	5 3 4	104 5	PD
9	10	11	
5 7 5	4 4 5	6 106	PD
2	1	2	Mobil
5 7 5	4 4 5	6 106	CAL
0 0 0	0 0 0	0 0 0	CEJ-GM



Calculus

Surgery



Calculus

Lingual access done to preserve as much papilla and minimize recession

Case

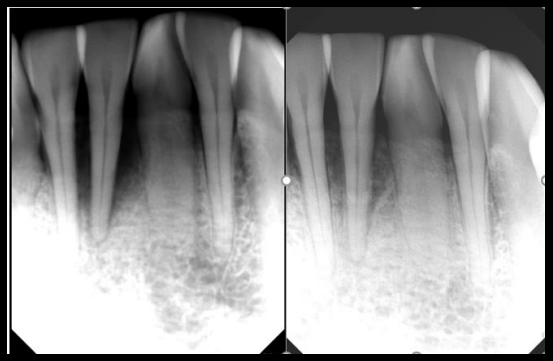
c/c ”I can't afford implants, and I know I have deep pockets on my lower teeth”

Malocclusion & Root Proximity is Noted!

Surgery

- FDBA (Puros) used along w/ EMD(enamel matrix derivative) derived from porcine teeth has a protein that mimics the matrix proteins that induce cementogenesis tissue healing
- Aids in stimulation of periodontal regeneration & cementum formation

Follow up



1 week follow up

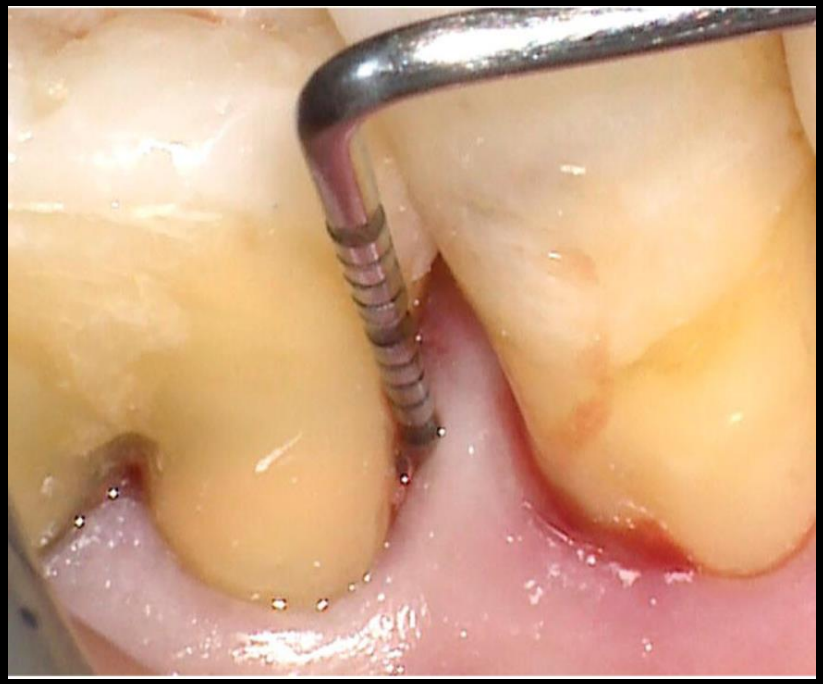
1 month follow up

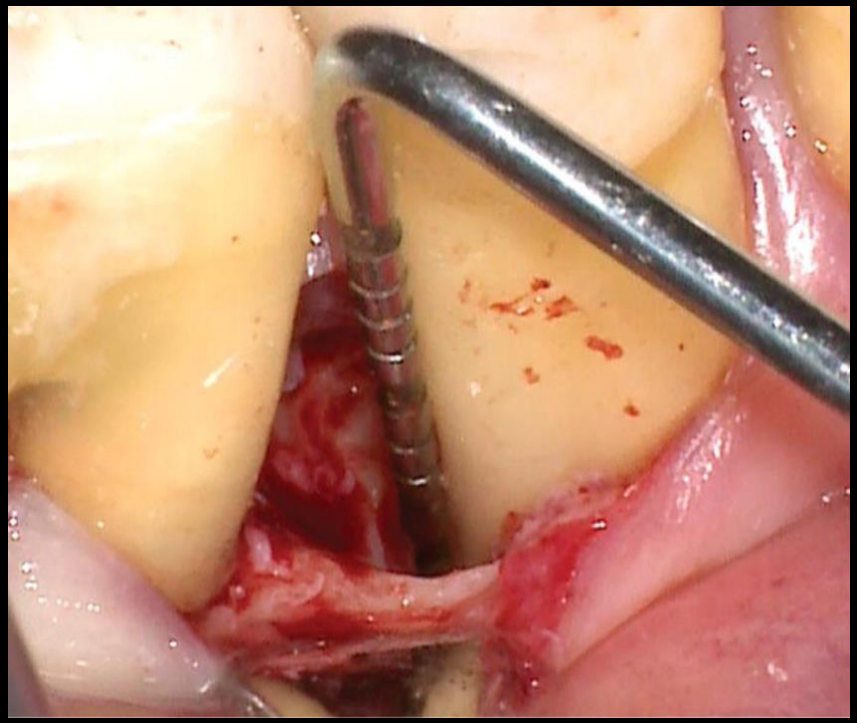
Initial PA 6-month PA

Follow up ~ 2 years

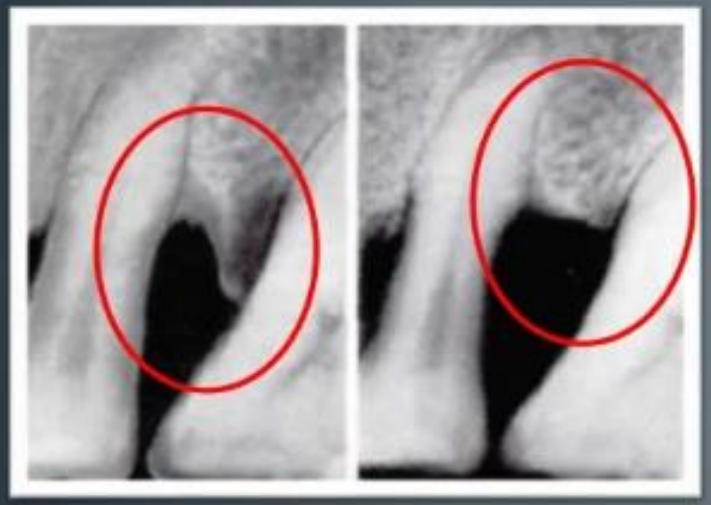
						Furcation
. . .	. . .	. . .	. . .	. . .	. . .	Plaque
						Calc
B B	B B B	B B B	B B B	B B B	B B B	BldS
-1 -1 -1	1 1 -1	-1 -1 -1	-1 -1 -1	-1 -1 -1	-1 -1 -1	CEJ-GM
2 4 4	4 6 5	7 4 9	5 5 4	4 2 2	2 1 2	CAL
0	0	2	0	0	0	Mobil
3 5 5	3 5 6	8 5 10	6 6 5	5 3 3	3 2 3	PD
27	26	25	24	23	22	
4 3 6	5 3 7	10 3 4	4 3 4	5 2 3	3 3 3	PD
0 0 0	0 0 0	0 0 0	-1 -1 1	-1 0 0	0 0 0	CEJ-GM
4 3 6	5 3 7	10 3 4	3 2 5	4 2 3	3 3 3	CAL
B	B B B	B B	B B B	B		BldS
						MGL
. . .	. . .	. . .	. . .	. . .	. . .	Plaque
						Calc
						Furcation

						Furcation
. . .	. . .	. . .	. . .	. . .	. . .	Plaque
						Calc
					B	BldS
0 0 0	0 1 1	0 0 1	0 0 0	-1 0 -1	0 0 0	CEJ-GM
4 3 3	3 4 4	3 3 5	4 4 3	2 3 2	3 3 3	CAL
1	1	1	0	0	0	Mobil
4 3 3	3 3 3	3 3 4	4 4 3	3 3 3	3 3 3	PD
27	26	25	24	23	22	
3 3 3	3 3 3	3 3 3	3 3 3	3 2 3	2 2 3	PD
0 0 0	0 3 0	0 0 0	0 0 2	0 0 0	0 0 0	CEJ-GM
3 3 3	3 6 3	3 3 3	3 3 5	3 2 3	2 2 3	CAL
	B					BldS
						MGL
. . .	. . .	. . .	. . .	. . .	. . .	Plaque
						Calc
						Furcation





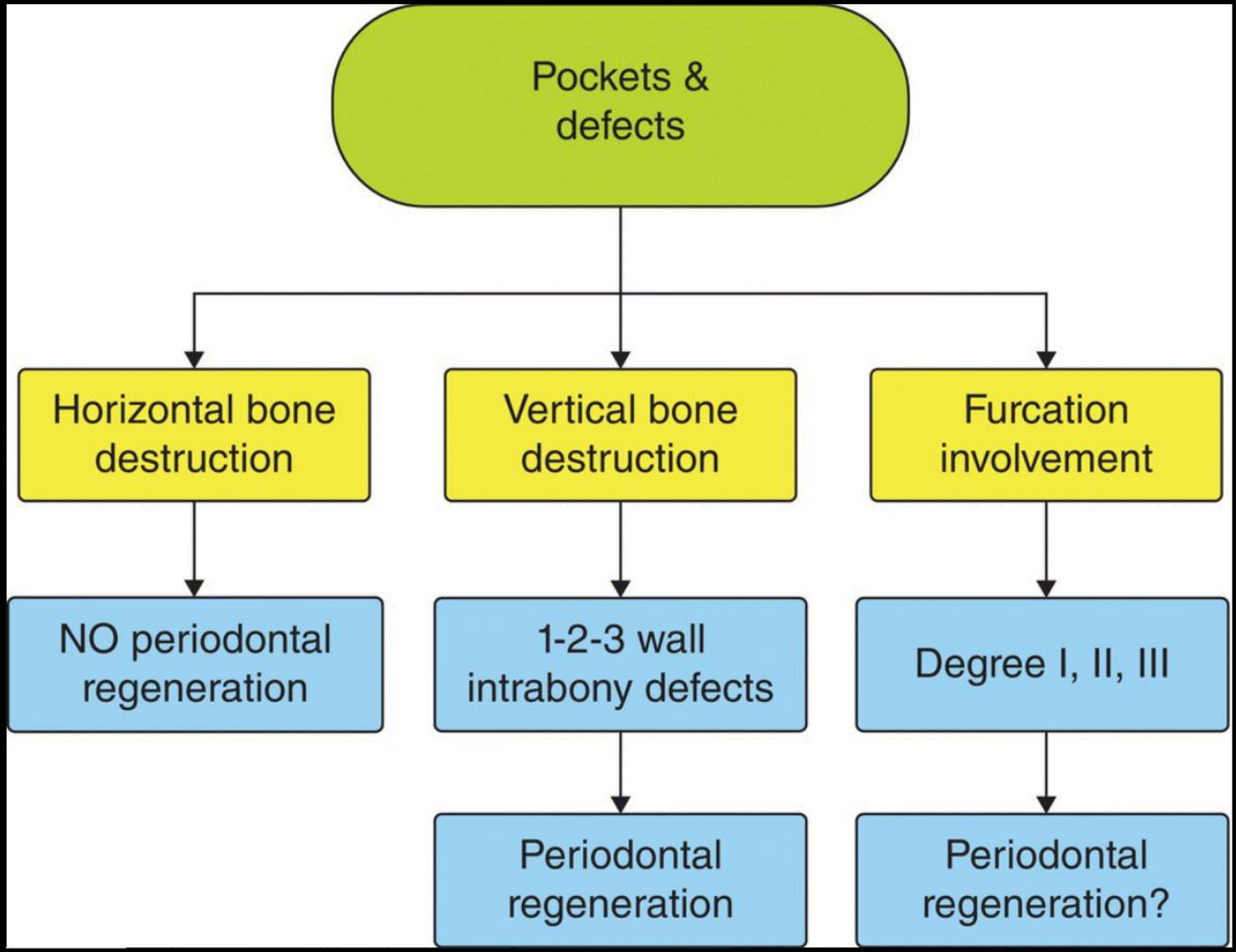
- Subrtactive and additive osseous surgery



subtractive osseous *surgery* is designed to restore the form of preexisting alveolar bone to the level present at the time of surgery or slightly more apical to this level

Additive osseous surgery includes procedures directed at restoring the alveolar bone to its original level

Courtesy of Dr Shivanand


Pockets & defects
Horizontal bone destruction
Vertical bone destruction
Furcation involvement
NO periodontal regeneration
1-2-3 wall intrabony defects
Degree I, II, III
Periodontal regeneration
Periodontal regeneration?

Trauma from periodontal surgery:

1. Nerve damage
2. Post-operative sensitivity-excessive gingival tissue removal
3. Excessive crown exposure – poor crown/root ratio
4. Poor esthetic outcome (Black triangle)- in anterior areas recommend minimal invasive surgery

5. Tissue sloughing

6. Post-operative prolonged bleeding

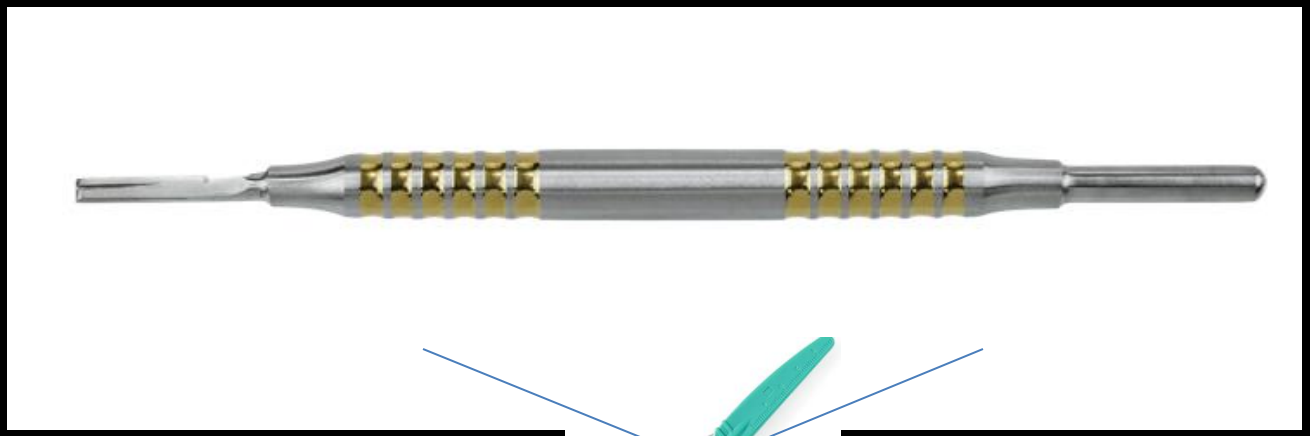
7. Long-term food impaction

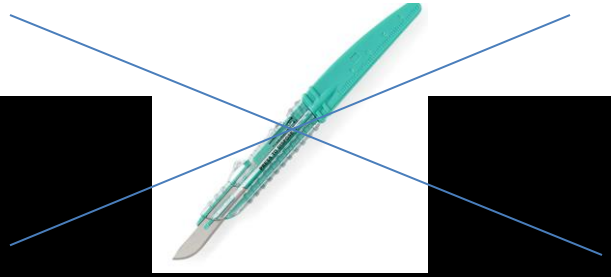
8. Creation of secondary tooth mobility

9. Root caries susceptibility

- If you want to try to do basic surgery start with crown lengthening procedures first
- Important things to consider amount of KT, crown to root ratio, anatomical variations, restorative plan, ferrule etc.
- If you have a basic understanding of surgical principles and suturing, this is a good procedure to perform for basic perio surgery

- Once you decide on doing surgery, you need to have surgical instruments
- Surgical kit needs to have other than a periodontal probe and mirror all the items described
- Start incision with your blade holder, use a 15 or 15C blade (recommend) over disposable, in tight corners try a curved 12





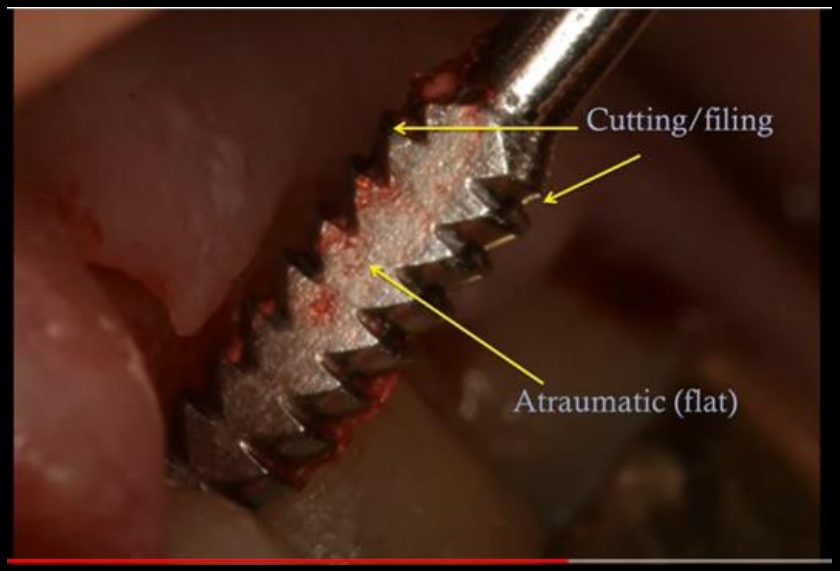
- After r rban knife
- After C uuser while staying on bor

osseonews.com — Private

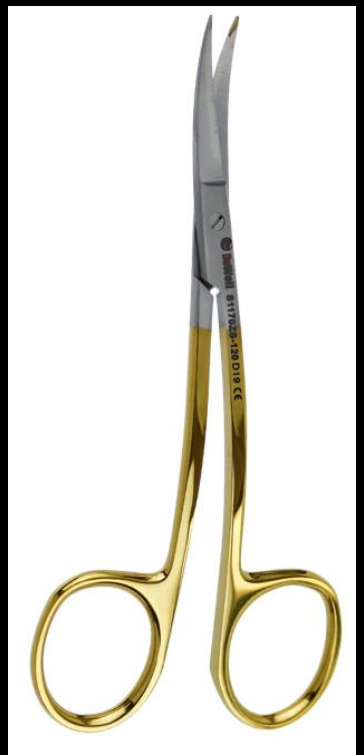
- Upon flap exposure, use a Minnesota & Pritchard elevator for reflection

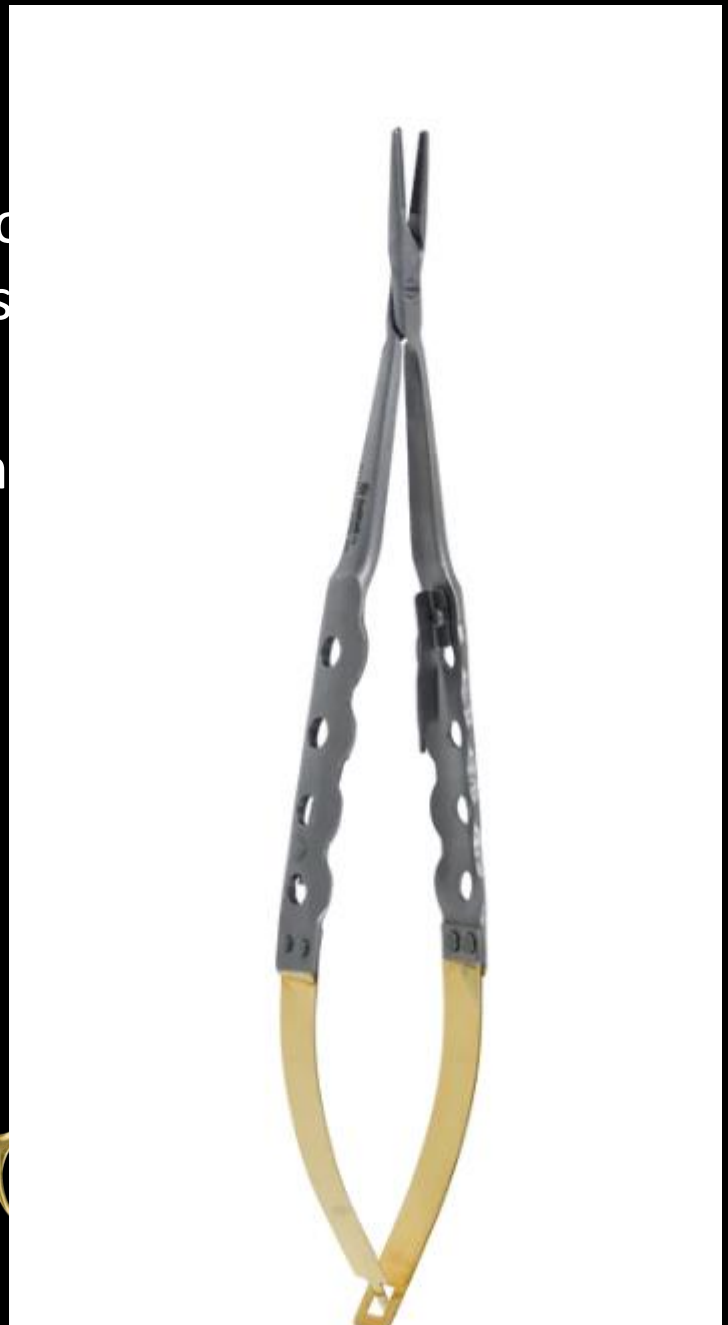
- Remove any granulation tissues from your ridge with a periosteal chisel

- For crown lengthening & osseous surgeries, use hand instruments like Sugarman and Schluger files



- Upon performing surgery, you need a go
  scissors/micro scissors, cotton pliers & s
- Most important instrument for perio su
  the CASTROVIEJO, more finesse movem
  smaller tissue bites

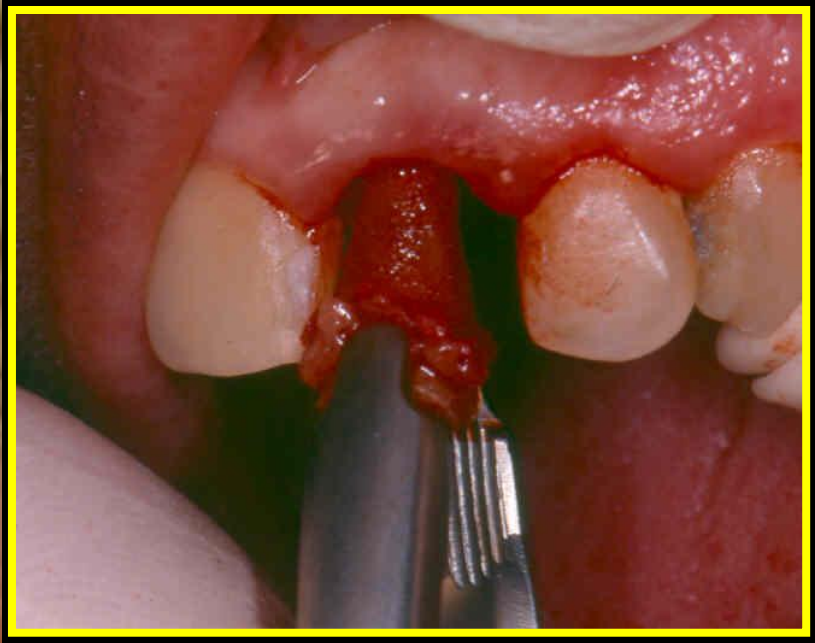




Surgical kit

- All the instruments needed for periodontal surgery should be in a plastic kit which is autoclavable
- Instruments should be ergonomic & neither too heavy or light

Traumatic tooth extraction may cause ridge deficiency



- Power tomes or Autotome are also an option
- Essentially, an electronic periotome that eliminates the mallet portion of the conventional periotome
- It has a handpiece with a periotome with the ability to use different tips
- Benefit of setting up RPM per providers preference, talk to your Dowell Rep


U
L
A
P
T

Mucogingival deformity

Q. What does this term mean?

A. An altered relationship between the mucogingival junction & gingival margin that are either associated with progressive gum recession or do not allow for the control of inflammation

Mucogingival deformities and conditions around teeth*

1. Periodontal biotype
   a. thin scalloped
   b. thick scalloped
   c. thick flat
2. gingival/soft tissue recession
   a. facial or lingual surfaces
   b. interproximal (papillary)
   c. severity of recession (Cairo RT1, 2, 3)
   d. gingival thickness
   e. gingival width
   f. presence of NCCL / cervical caries
   g. patient aesthetic concern (Smile Esthetic Index)
   h. presence of hypersensitivity
3. lack of keratinized gingiva
4. decreased vestibular depth
5. aberrant frenum/muscle position
6. gingival excess
   a. pseudo-pocket
   b. inconsistent gingival margin
   c. excessive gingival display
   d. gingival enlargement
7. abnormal color

*FIGURE 1 Modified from the AAP 1999 Consensus Report, shown in Table 1.

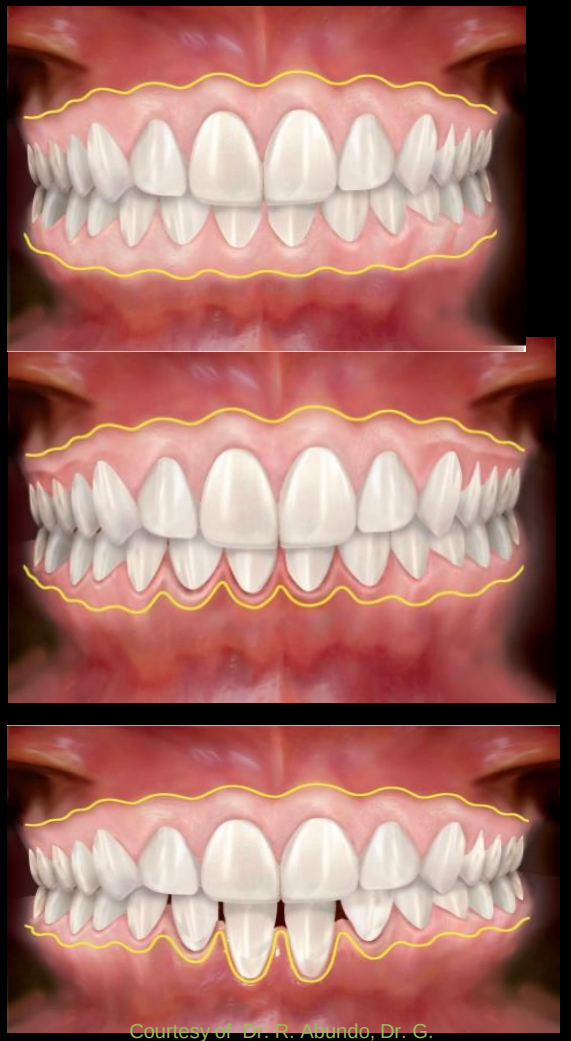
Cortellini & Bissada

Soft-Tissue Regeneration Illustrations

Schematic illustration of a natural healthy mucogingival line

Schematic illustration of a shifted mucogingival line with reduced keratinized tissue

Schematic illustration of a shifted mucogingival line with reduced keratinized tissue and gingival recessions



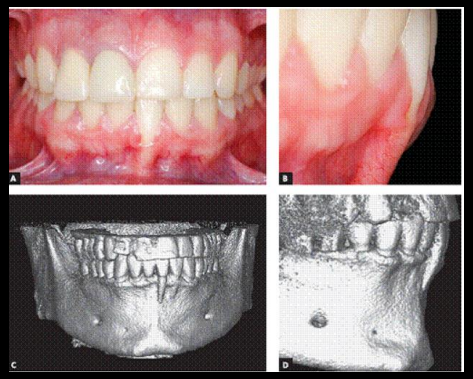
Courtesy of Dr. R. Abundo, Dr. G. Corrente and ACME Publishing

Etiology

- Gingival Recession is defined as the location of the gingival margin being apical to the cemento-enamel junction & the etiology is multifactorial from predisposing and precipitating factors

Predisposing factors

1. **Bone dehiscence/Fenestration** defects



2. **Tooth Malposition** - Facial position of prominent roots can contribute

3. **Thin tissue-** Thinner gingival tissues are more susceptible to gingival recession

Etiology

4**. Inadequate keratinized/attached mucosa**- ≤ 2mm per Lang et al.

5. **Frenum pull**- attachment of frenum close to gingival margin
(Aberrant frenum is defined as a muscle attachment that is extending coronal to the mucogingival junction)

Etiology

- Different frenum variations classified depending upon the extension of attachment fibers

1. Mucosal- frenal fibers are attached up to mucogingival junction

2. Gingival- fibers inserted w/in attached gingiva

3. Papillary- fibers extending into interdental papilla

4. Papillary penetrating- frenum fibers cross the alveolar process & extend up to palatine papilla

Priyanka et al. An overview of frenal attachments. J Indian Soc Periodontology. 2013 Jan-Feb; 17 (1): 12-15

Etiology

- **Precipitating factors**

1. **Traumatic forces**-excessive toothbrushing, factors such as brushing force, brush hardness, frequency, duration of teeth brushing etc.
2. **Habits**- smoking, smokeless tobacco, oral piercing, chemical irritants lead to inflammatory tissue changes causing REC.

Recession identified near location of smokeless tobacco, tobacco pouch keratosis around vestibule

Piercings

- Cross sectional study included 50 subjects w/lower lip studs & Clinical parameters such as PI,PD,REC, CAL, width of KT etc. measured
- REC seen in 68% of test group (stud) vs 4% control w/o stud, localized periodontitis 4% test subjects
- Prevalence of REC is associated w/labial piercing & narrow band of KT is associated w/ > REC in mandibular anterior teeth -*Kapferer et al*

- Case study per Chambrone et al. concluded that in addition to loss of attached gingiva, free gingival margin ulceration, tooth abrasion, >plaque bu & hypersensitivity noted w/ piercings

Etiology

4. **Plaque induced inflammation**-Poor OH associated w/ REC due to plaque build up & attachment loss

- Dental plaque and gingival inflammation association with REC reported to be statistically significant with REC being the result of more than one factor acting together

5. Dental treatment-orthodontic tooth movement, subgingival restorations

• Orthodontic movement of the lower incisors in proclination with forward tipping leading to thinning of alveolar bone and soft tissue on the buccal aspect of the tooth.

6. **Subgingival restorations** can affect periodontal tissue in terms of margin design

- 12-month randomized clinical trial conducted to compare effect of subgingival margin in the maxillary anterior zone would affect periodontal soft tissue parameters such as gingival recession
- 106 teeth prepared with deep chamfer or horizontal finish line (H) vs 94 with feather edge or vertical (V) finish line. All finish lines were positioned 0.5mm subgingival
- 12-month f/u statistically significance noted b/w both preparations, no gingival REC in ~97% restorations prepared w/ V vs ~89% of the restoration's w/ H finish line

Paniz et al. Periodontal response to two different subgingival restorative margin designs: a 12-month randomized clinical trial. Clin Oral Investig 2016 Jul;20 (6): 1243-52.

Common risk factors of gingival recession

Predisposing Factors	Precipitating Factors
1. Bone dehiscence	1. Traumatic forces, eg, excessive brushing
2. Tooth malposition	2. Habits, eg, smoking, oral piercing
3. Thin tissue	3. Plaque-induced inflammation
4. Inadequate keratinized/attached mucosa	4. Dental treatment, eg, certain types of orthodontic tooth movement, subgingival restorations
5. Frenum pull	

Chan et al. Does Gingival Recession Require Surgical Treatment? Dent Clin N Am 59 (2015) 981-996

What are we trying to attain from soft tissue grafting surgery procedures?

-Augment/enhance soft tissue apical to the gingival margin to increase the gingival tissue thickness or alteration of gingival biotype- INCREASE KT (thickness)

-Augment/enhance soft tissue coronal to the gingival margin –ROOT COVERAGE (REC)

Root Coverage is warranted #23,24 with lack of KT noted #20-22

Goals of Treatment & Pt expectations

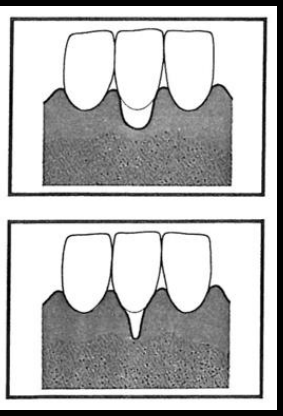
- Communicate goals of treatment prior to procedure

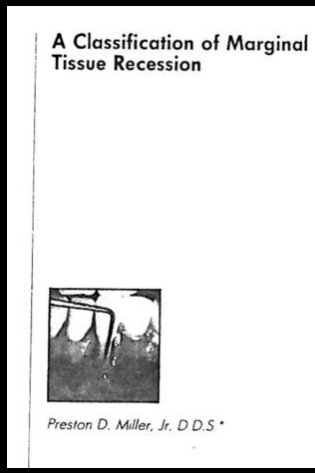
- 3 types of soft tissue grafting:

1. Pedicle soft tissue graft (CTG) 2. Free soft tissue graft (FGG) 3. Combination

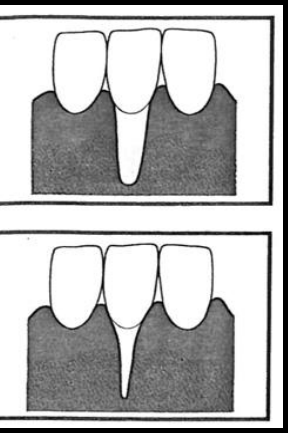
- Root coverage can be divided into primary & secondary; primary coverage occurs immediately following grafting & secondary root coverage (creeping attachment)

Classifications



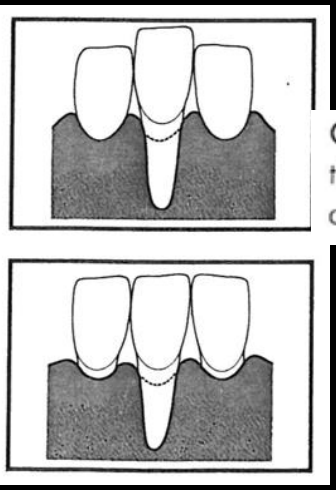


Class I – Marginal tissue recession which does not extend to the mucogingival junction. There is no periodontal loss (bone or soft tissue) in the interdental area, and 100% root coverage can be anticipated.

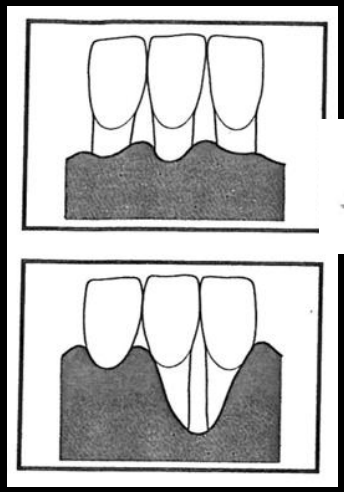


Class II – Marginal tissue recession which extends to or beyond the mucogingival junction. There is no periodontal loss (bone or soft tissue) in the interdental area, and 100% root coverage can be anticipated.

Classifications



Class III – Marginal tissue recession which extends to or beyond the mucogingival junction. Bone or soft tissue loss in the interdental area is present or there is malpositioning of the teeth which prevents the attempting of 100% root coverage. Partial root coverage can be anticipated.



Class IV – Marginal tissue recession which extends to or beyond the mucogingival junction. The bone or soft tissue loss in the interdental area and/or malpositioning of teeth is so severe that root coverage cannot be anticipated.

Classifications

Table 1. Miller's classification of gingival recession defects.

	Symptoms	Treatment	Success
Class I	Recession that does not extend to the mucogingival junction	Complete root coverage is achievable	100%
Class II	Recession that extends to or beyond the mucogingival junction, with no periodontal attachment loss (i.e bone, soft tissue)	Complete root coverage is achievable	100%
Class III	Recession that extends to or beyond the mucogingival junction, with periodontal attachment loss in the interdental area or malpositioning of the teeth	Only partial root coverage possible to the height of the contour of interproximal tissue	50-70%
Class IV	Recession that extends to or beyond the mucogingival junction, with severe bone or soft-tissue loss in the interdental area and/or severe malpositioning of the teeth	Root coverage is unpredictable and requires adjunctive treatment (ie orthodontics)	<10%

Zuhr/Hurzeler — Plastic-Esthetic Periodontal and Implant Surgery

Classifications

Limitations of Miller

-No information provided about KT & components i.e., free & attached gingiva

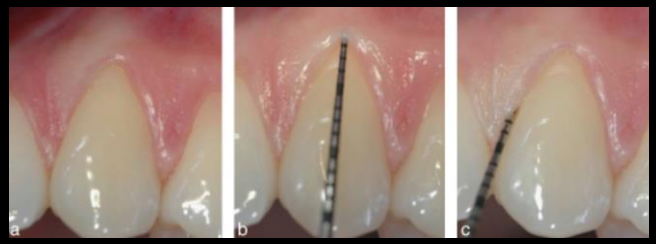
-No information on where the MGJ is causing classification difficulties b/w Class I &II. Is tissue thick or thin?

-Cl III & IV defects do not discuss the amount & severity of bone loss and this is variable is considered very important

-Cl III defects have partial root coverage prognosis, however Aroca et al 2010 state complete root coverage, difficult to use a periodontal probe per Miller to determine amount of root coverage presurgical per studies

Pini-Prato G. The Miller classification of gingival recession: limits and drawbacks. J Clin Periodontol 2011; 38: 243-245.

Classifications



Recession Type 1 (RT1): Gingival recession with no loss of interproximal attachment. Interproximal CEJ was clinically not detectable at both mesial and distal aspects of the tooth

Recession Type 2 (RT2): Gingival recession associated with loss of inter- proximal attachment. The amount of interproximal attachment loss (measured from the interproximal CEJ to the depth of the interproximal pocket) was less than or equal to the buccal attachment loss (measured from the buccal CEJ to the depth of the buccal pocket)

Recession Type 3 (RT3): Gingival recession associated with loss of inter- proximal attachment. The amount of interproximal attachment loss (measured from the interproximal CEJ to the depth of the pocket) was higher than the buccal attachment loss (measured from the buccal CEJ to the depth of the buccal pocket)

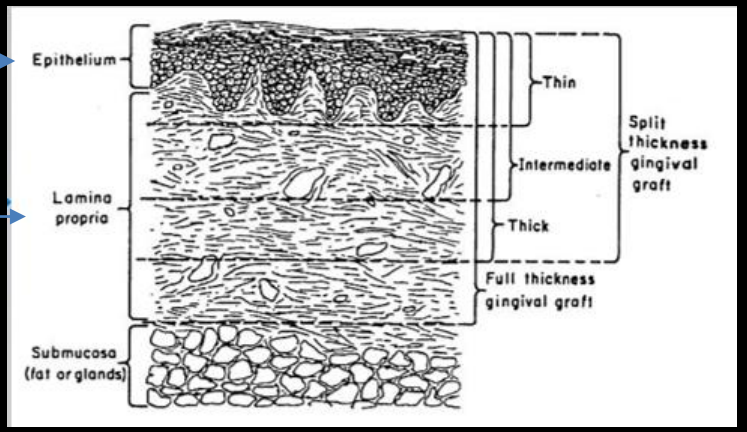
-New classification system tested in 116 REC in 25 pts , RT classification was accurate in predicting REC reduction @ 6-month f/u in 109 treated sites

-Interproximal CAL can be used to accurately classify REC defects and predict final outcomes per Pini Prato et al.

GRAFTING SOURCES

FREE GINIGIVAL GRAFTS

CONNECTIVE TISSUE GRAFTS



FGG – used in cases primarily where lack of KT & epithelial layer of palate (0.75-1.25mm)

CTG-used in cases for root coverage, it is taken from the middle layer of the palate "thicker layer"

Ortho and recession

- Orthodontics and perio have a close relationship with the effects of one can affect the other
- c/c “ I love my smile but now I am pain in one area & it is always sensitive

Ortho and recession

- What do we see here? Is this a simple recession coverage case?
- Think like a periodontist, what do we see here?

Lack of KT, Thin phenotype, Miller Class 3, Shallow Vestibule.
Difficult to increase root coverage but we can try to increase band of keratinized tissue

6 weeks PO check, area starting to keratinize

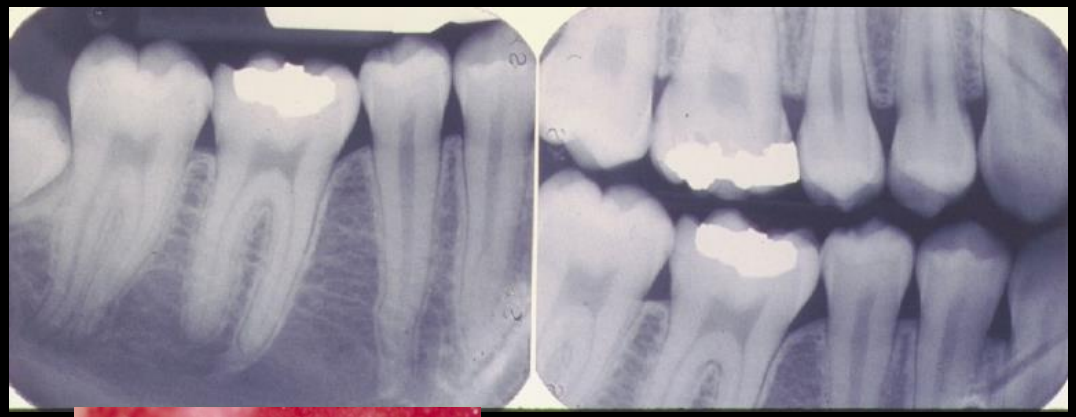
Iatrogenic & ORTHODONTIC THERAPY

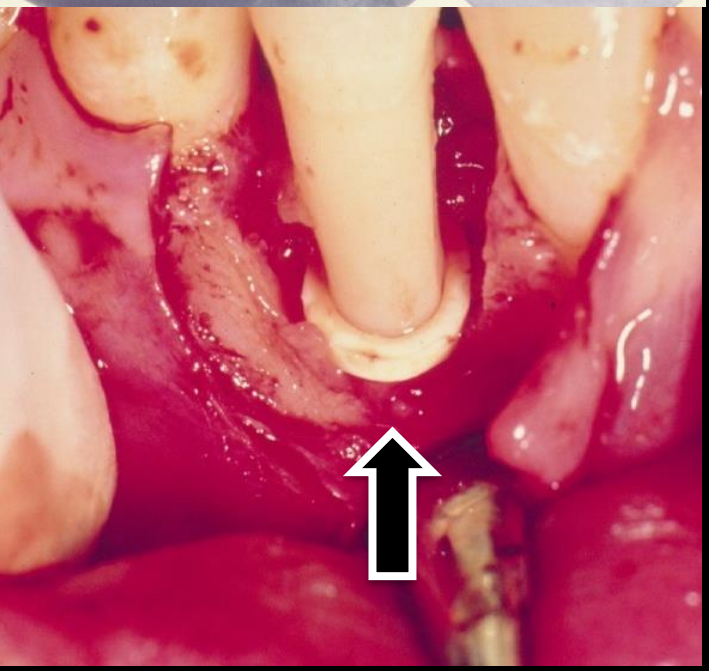
Inadequate office or patient maintenance during orthodontic care may result in periodontal inflammation

-Gingival overgrowth related to plaque around orthodontic appliances

-This points to a need for supportive hygiene therapy on a higher recall phase while bands are in place

Iatrogenic orthodontic therapy of adult patients (residual elastic band)





Removal of the orthodontic elastic rids the cause but healing the effect is not predictable.

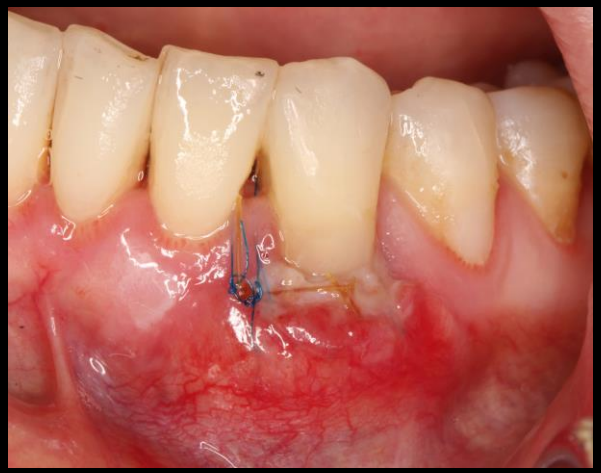
Case

“I clean my teeth all the time, but I have one area that always hurts me when I brush, and it bleeds. It started after I had braces”

Surgery

Follow up 1 week & 1 year

Pre-op



1 Week

1 year

Risks of autogenous grafting

Vascularity Considerations

Per Reiser et al.

-Terminal branch of greater palatine artery can extend anteriorly up to incisive foramen

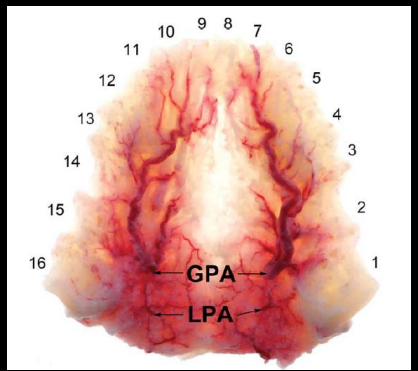
-Anterior aspect of donor site should NOT extend past the canine tooth to avoid running risk of damaging greater palatine artery & branches

Per Kim et al.

-Regardless of high or low palatal vault largest tissue graft could be harvested at second PM region and smallest graft at canine

-Reiterated the importance of identifying different palatal vaults prior to incision

-Maximum size & thickness of tissue from second PM region are 9.3mm & 4.0mm



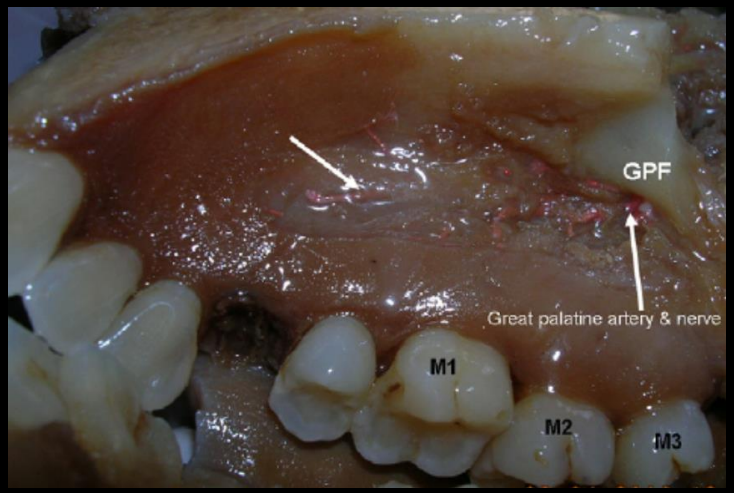
Complications

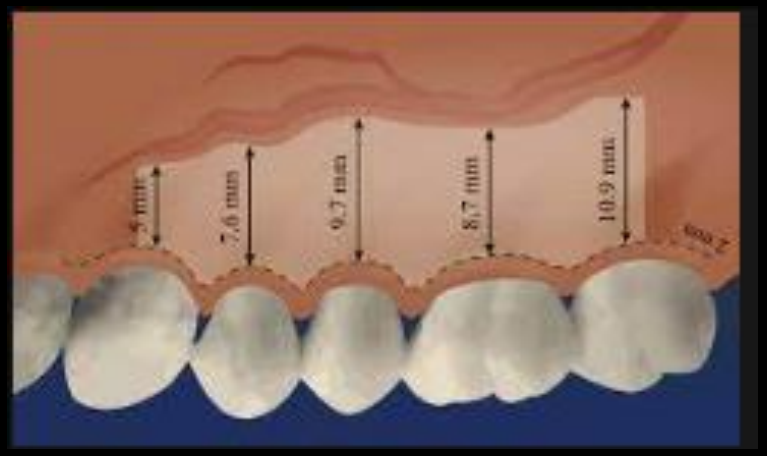
Bleeding from palatine vessels

1. Immediate direct pressure w/ injection of a local anesthesia containing local vasoconstrictors into the area, pressure for constant 5’

2. Placement of ≥ 1 sutures proximal to bleeding site (i.e., b/w bleeding site & foramen)

3. Elevation of FTF –reflect vessel w/flap, visualized & ligate vessel





Grafting Sources

1. ***Autogenous-*** Donor sites such as the palate & maxillary tuberosity

2. ***Allograft-*** Acellular Dermal Matrix (Alloderm, Neoderm, Apligraf)

3. ***Xenograft-***Mucograft, Fibro-Gide (Geistlich)

4. ***Biologics***- EMD (Emdogain, Straumann), rhPDGF-BB (GEM 21S)

Alternative Grafting Materials

Alloderm
Mucograft, Fibro Gide
Collagen Membrane

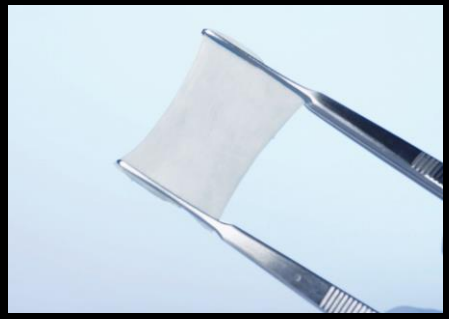
Alternatives Geistlich

Xenograft materials designed instead of harvesting from donor sites

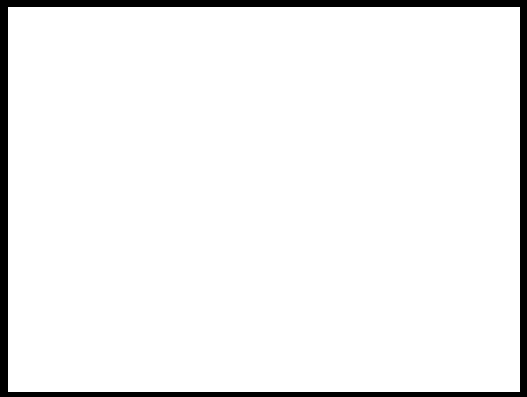
- Extracellular matrix membrane (ECM) & bilayered collagen membrane (BCM)
- ECM is used as grafting material for gingival augmentation, extraction process permits the ability to retain the proteins of the extracellular matrix vs BCM is a 2-layered collagen membrane with Type I & Type III collagen tissue
- Porcine derived , BCM is a 2-layered xenogeneic collagen membrane

Mucograft

Fibro guide



Bio-Gide

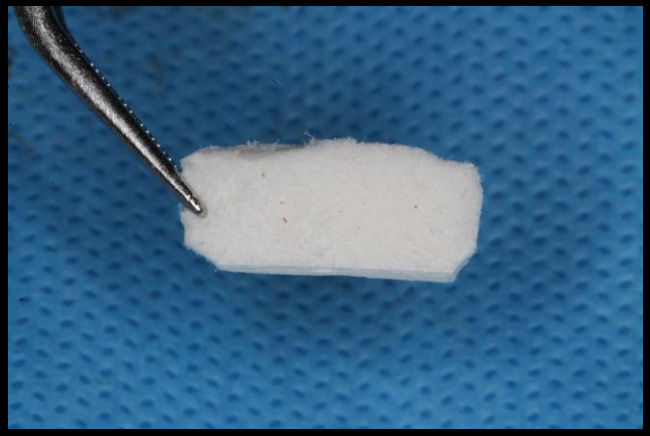


Case

"I have a hard time cleaning my lower teeth, and feel like I cannot talk properly, I don't want you to use my palate for grafting"

- High frenum, inadequate KT- (As a periodontist this is what my thought process is)

- Goal is NOT root coverage but to increase KT, high frenum pull. Slight recession coverage can occur, not 100%



Follow Up

3-weeks

3-months

Pre-op

Post-op

- Geistlich Mucograft indicated for gain of keratinized tissue and for recession coverage
- Benefits include no harvest-site morbidity, less pain , < surgical chair time vs autogenous grafts
- Natural soft tissue color & texture which matches and blends with adjacent tissues
- Early vascularization and soft tissue ingrowth, accelerated wound healing

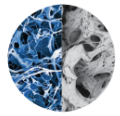
- Fibro-Gide provides an alternative to gold standard, connective tissue graft for root coverage

Geistlich Fibro-Gide®	VS	Connective Tissue Graft
No tissue harvesting needed	**Harvesting**	Complex tissue harvesting procedure
Unlimited availability	**Availability**	Limited availability due to different anatomical dimensions of the patient vault
Consistent & standardized product quality due to the Geistlich quality process	**Quality**	Inconsistent tissue quality; dependent on the patient's anatomy
Pre-defined thickness of 6mm	**Thickness**	Limited by the anatomy of the patient's palate
Ready to use	**Preparation**	Post-extraction, slippery graft requires additional adaptation
Submerged healing	**Healing**	Open or submerged healing
No risk of necrosis	**Complications**	Risk of necrosis
› 15 × 20 × 6 mm › 20 × 40 × 6 mm Size can be adjusted according to the defect	**Size**	Size of the donor tissue varies with the different anatomical dimensions of the palatal vault[9]
The absence of a donor site significantly reduces post-operative pain and minimizes potential post-operative complications[1,10-12]	**Patient Morbidity**	Discomfort, pain and numbness, especially at the donor site, can last up to several weeks post-surgery[13-16]

What is the Right Choice for You?

Geistlich Fibro-Gide® and Geistlich Mucograft® each offer unique benefits, allowing you to select the right matrix for your specific clinical needs.

Ideal Matrix for the Gain of Keratinized Tissue



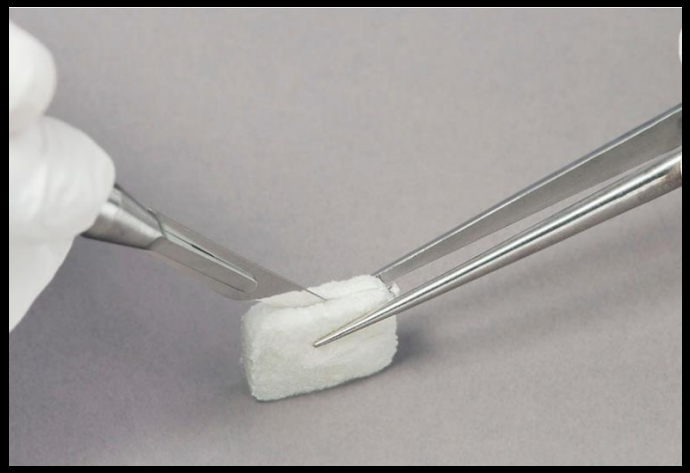
The Right Solution for Volume Stability

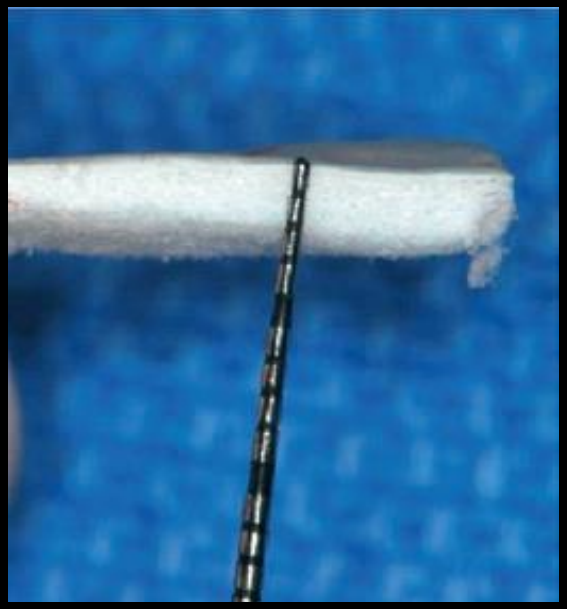
Compact and spongy layer	**Structure**	Porous layer
Reconstituted collagen – no cross-linking	**Cross-linking**	Reconstituted collagen – smart cross-linking
Reduced volume stability	**Stability**	Good volume stability
Open and submerged healing	**Healing**	Submerged healing
Gain of keratinized tissue Socket Seal Vestibuloplasty Recession Coverage	**Indications**	Soft tissue volume augmentation around implants and natural teeth, and under pontics Recession Coverage
"More than two-thirds of the patients preferred the appearance of collagen matrix therapy." McGuire, M.K. et al. (2014). J Periodontol. 85(10):1333-41	**Patient Reported Outcomes**	**"One of the greatest benefits of using soft tissue substitutes is decreased patient morbidity."** Thoma DS. et al. J Clin Periodontol. 2020 May;47(5):630-39

Fibro-Gide indications is the ability to increase soft tissue thickness around teeth & implants however based on my clinical experience usage of Mucograft gives you increase in KT

Per Schmitt et al. CM was comparable to gold standard of FGG

Xenograft/Allograft





ADVANTAGES

Lower Morbidity
Unlimited Supply
Esthetics
No anatomical considerations
Lower treatment time

DISADVANTAGES

Cost
Religious & Personal Preference
Needs to be Submerged
Possible allergic reaction

Creeping Attachment?

Grafting around implants

- In majority of implant cases, implants placed around the molar sites w/o any emphasis of KT
- Lack of KT around implants can be controversial in terms of inflammation, plaque accumulation, bleeding on probing & pain
- However, pt. is the determining factor, if patient complains of pain or accumulation of plaque possible mucogingival deformity

Grafting around implants

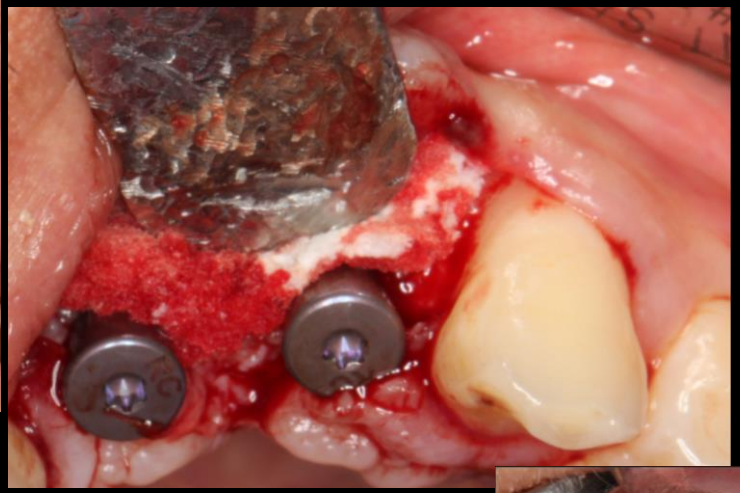
- Autogenous SCTG considered to be gold standard to augment soft tissue volume at implant sites and in partially edentulous sites per Thoma et al. 2014

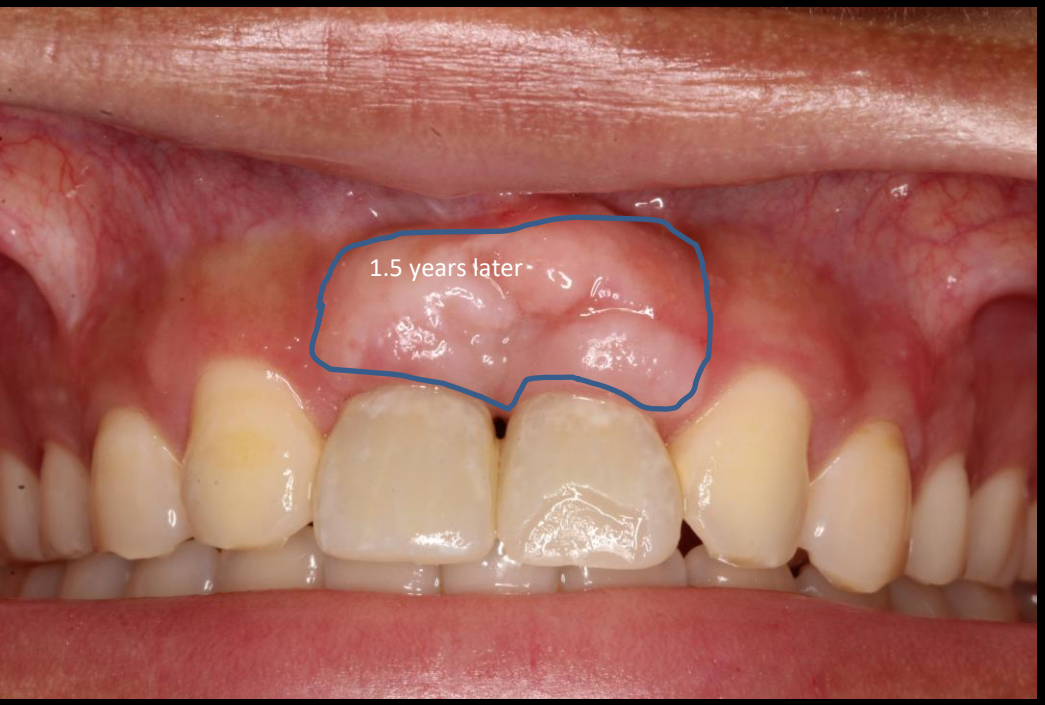
- Limitations of autogenous grafts

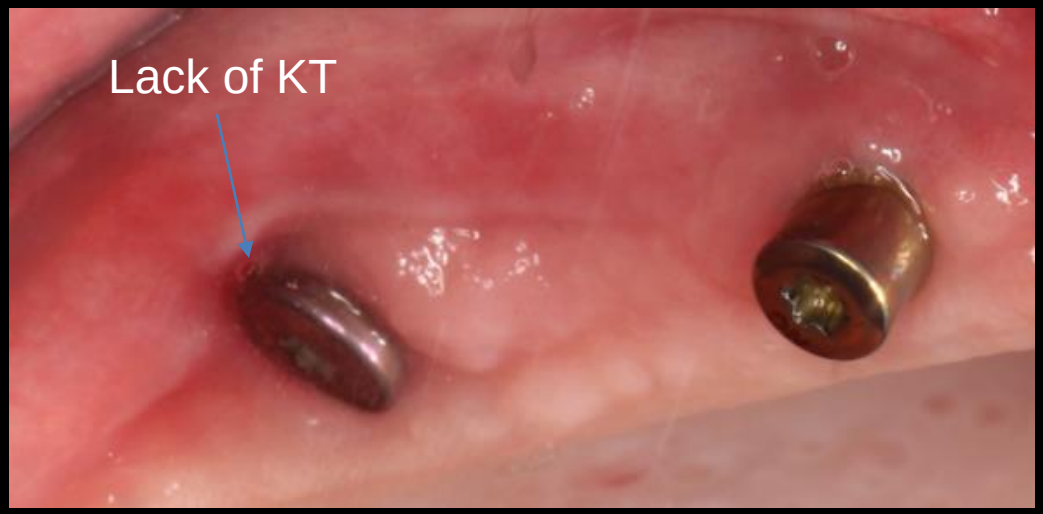
i) the height, length & thickness of donor site varies

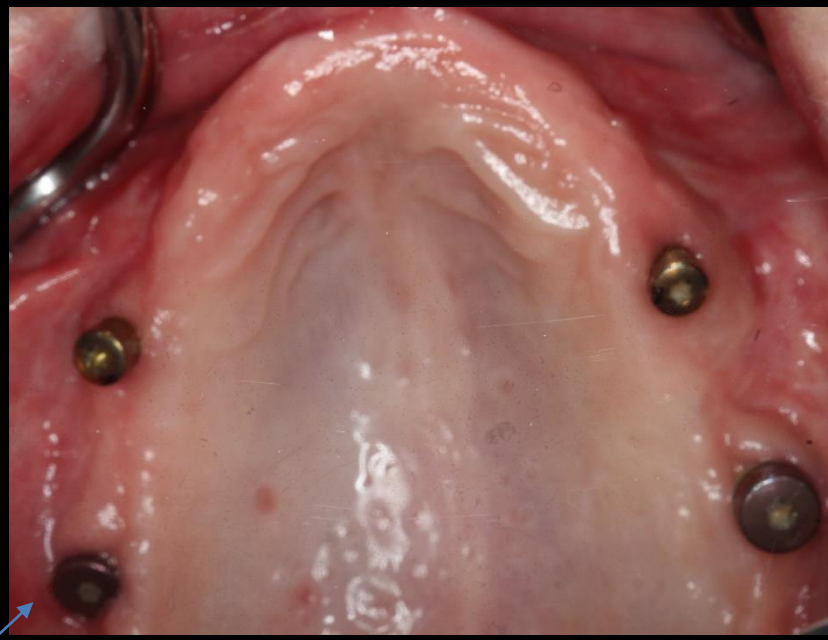
ii) length & thickness are limited by anatomical factors such as exostosis, tori, thick alveolar process & greater palatine artery and nerve per Yu et al. 2014

iii) patient complain about pain & numbness specifically in the donor site for several weeks after surgery per Cairo et al. 2014



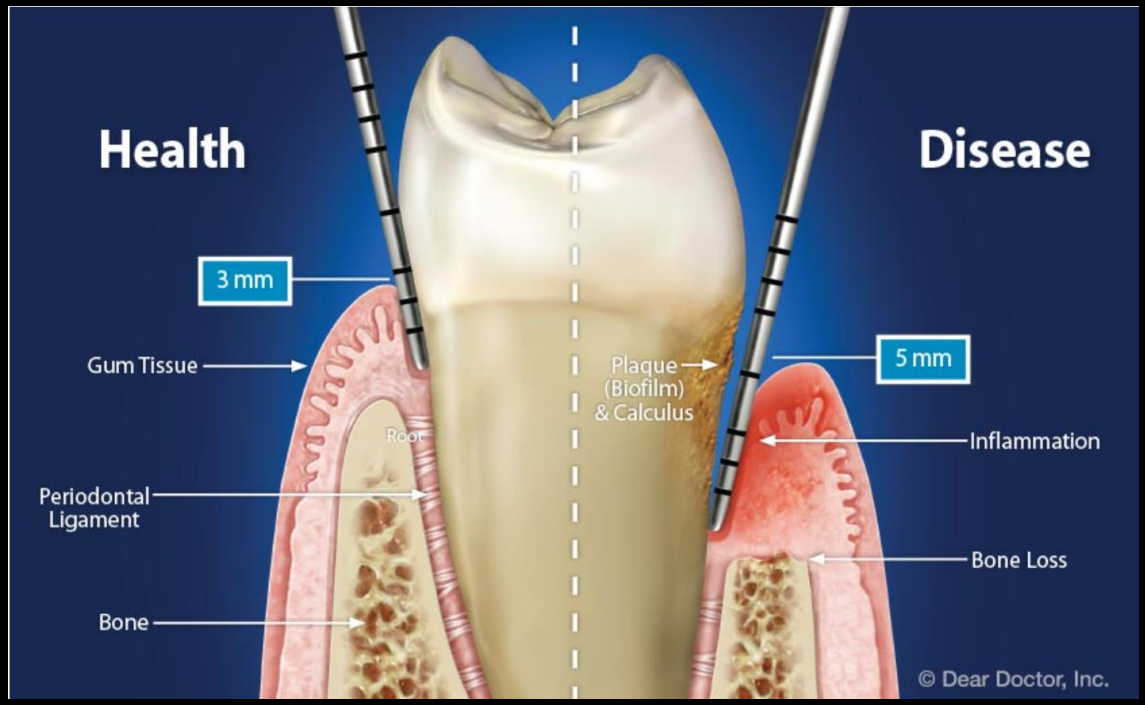

1.5 years later





Pt reports constant pain & tenderness

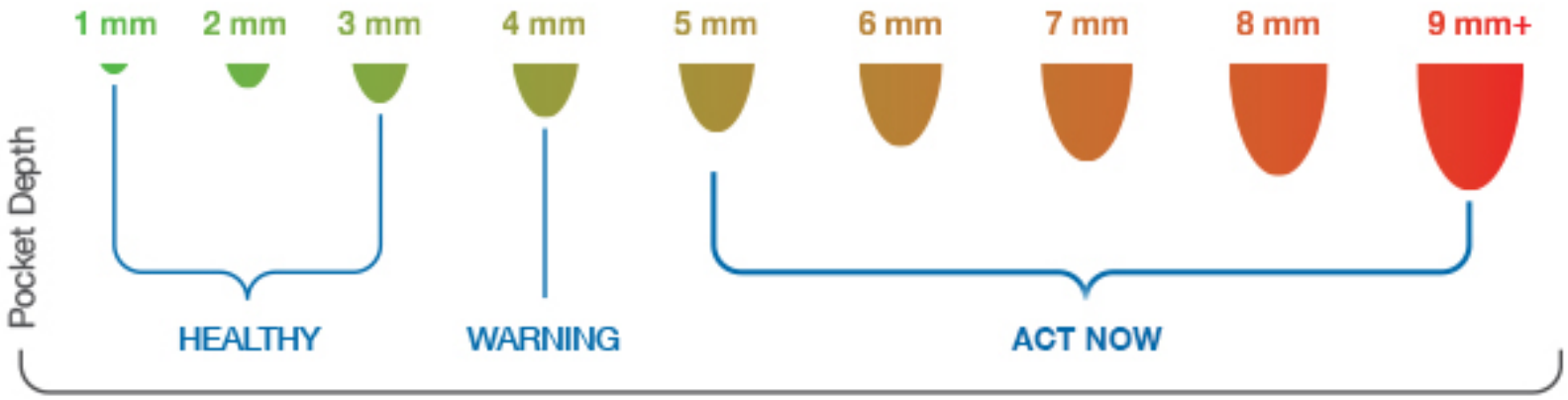
Periodontal pocket



- Periodontal probing depth (PD)-measured from the free gingival margin to the base of the sulcus
- Recession (Rec)- measured from the CEJ to the gingival margin, if there is recession it is assigned a + number, if there is gingival overgrowth it is assigned a – number (inflamed gingiva, pseudo pockets etc.)
- Clinical Attachment Level (CAL)- measured from the CEJ to the base of the sulcus, true measure of knowing periodontal status

Pockets increase in depth

Your dental professional will measure the depth of your pockets using a tiny probe. A pocket of 4 or more millimeters is a sign that you have gum disease. If you wait to treat your gum disease, it could lead to painful and expensive surgery in the future. **So don't wait. Ask your dental professional how ARESTIN® can help prevent further damage today.**



A pocket depth of **4 mm** or more may mean you have an infection.
A pocket depth of **7 mm** or more has the highest risk of permanent damage.

- Explain to the patient what these numbers mean so they understand what periodontal pockets are during data collection
- Educate your patient!

CLINICAL ATTACHMENT LOSS, CALCULATION

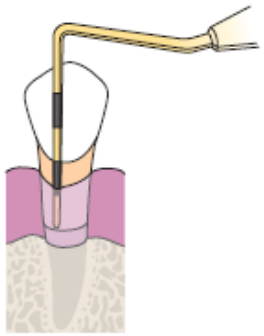
CALCULATING CAL IN THE PRESENCE OF RECESSION OF THE GINGIVAL MARGIN

When recession of the gingival margin is present, the CAL is calculated by **adding** the probing depth to the gingival margin level.

Example:

Probing depth measurement: 4 mm
Gingival margin level: +2 mm*
Clinical attachment loss: 6 mm

* = 2 mm of tissue needs ***to be added*** for the gingival margin to be at its normal level.



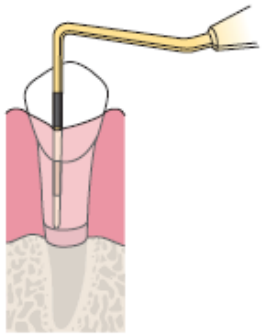
CALCULATING CAL WHEN THE GINGIVAL MARGIN COVERS THE CEJ

When the gingival margin is coronal to the CEJ, the CAL is calculated by **subtracting** the gingival margin level from the probing depth.

Example:

Probing depth measurement: 9 mm
Gingival margin level: -3 mm*
Clinical attachment loss: 6 mm

* = 3 mm of tissue needs ***to be taken away*** for the gingival margin to be at its normal level.



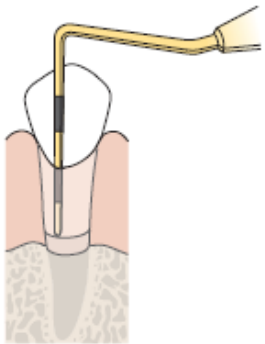
CALCULATING CAL WHEN THE GINGIVAL MARGIN IS AT THE NORMAL LEVEL

When the gingival margin is slightly coronal to the CEJ, no calculations are needed since the probing depth and the clinical attachment level are equal.

Example:

Probing depth measurement: 6 mm
Gingival margin level: 0 mm*
Clinical attachment loss: 6 mm

* = gingival margin is at the normal level; therefore no gingival tissue needs to be added or taken away (0).



(Images used with permission: http://ww.com)

Nield-Gehrig JS, *Fundamentals of Periodontal Instrumentation and Advanced Root Instrumentation*, 7th ed, Wolters Kluwer/Lippincott Williams and Wilkins: Philadelphia, PA, 453.

Ramfjord et al. proposed that loss of attachment was considered the measure of disease progression

Classification of Diseases

The World Workshop classified Periodontal and Peri-Implants Diseases and Conditions (J Periodontol 2018:89;Suppl 1 p173-82)

Classifications

Classification at-a-Glance

2018 Classification of Periodontal and Peri-Implant Diseases and Conditions

Periodontal Health, Gingival Diseases and Conditions

- Periodontal Health and Gingival Health
- Gingivitis: Dental Biofilm-Induced
- Gingival Diseases: Non-Dental Biofilm-Induced

Periodontitis

- Necrotizing Periodontal Diseases
- Periodontitis
- Periodontitis as a Manifestation of Systemic Disease
- Periodontal Abscesses and Endodontic-Periodontal Lesions

Periodontal Manifestations of Systemic Diseases and Developmental and Acquired Conditions

- Systemic Diseases or Conditions Affecting Periodontal Supporting Tissues
- Mucogingival Deformities and Conditions
- Traumatic Occlusal Forces
- Tooth- and Prosthesis-Related Factors

Peri-Implant Diseases and Conditions

- Peri-Implant Health
- Peri-Implant Mucositis
- Peri-Implantitis
- Peri-Implant Soft and Hard Tissue Deficiencies

How to we define health

- Periodontal health is defined as :

Intact Periodontium with Periodontal pockets ≤ 3mm, Bleeding <10% & No Loss of attachment

Chapple et al. JP 2018

Gingival Health

Reduced Periodontium: Loss of attachment is present with Bleeding < 10% on pockets ≤ 3mm

- NO pockets ≥ 4mm with bleeding

Chapple et al. JP 2018

- Loss of attachment (LOA) can be from numerous reason, it is NOT always associated with periodontal disease

- Reasons of LOA

1. Non carious cervical lesions (abrasions, abfraction etc.)
2. Crown lengthening
3. Extractions that affect root of adjacent dentition
4. Endodontic issues
5. Caries

Chapple et al. JP 2018

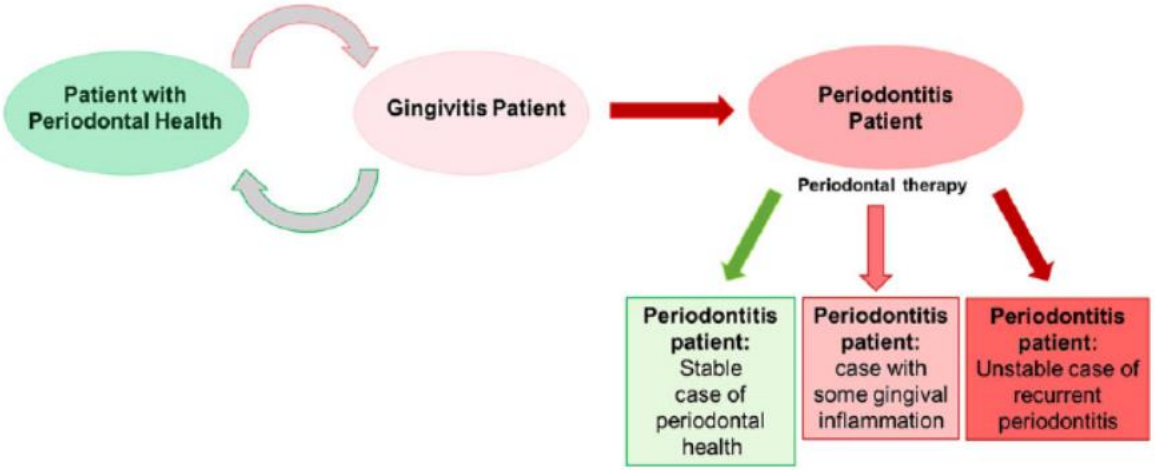


FIGURE 1 The transition from periodontal health to gingivitis is reversible following treatment that resolves gingival inflammation. The transition to periodontitis results in attachment loss which, at the present time is irreversible. More importantly, it signposts patients who are at lifelong high risk of recurrent periodontitis. Optimal periodontal therapy can restore gingival health on a reduced periodontium, or may result in mild marginal gingival inflammation at shallow probing pocket depths (≤ 3 mm). However, a history of periodontitis places patients at high risk of recurrent periodontitis and such patients require careful site-specific monitoring during periodontal maintenance programs

- Just like a diabetic patient is ALWAYS a diabetic patient regardless of the treatments they receive, once a perio patient ALWAYS a perio patient

TABLE 1 Diagnostic look-up table for gingival health or dental plaque-induced gingivitis in clinical practice

Intact periodontium	**Health**	**Gingivitis**
Probing attachment loss	No	No
Probing pocket depths (assuming no pseudo pockets)[a]	≤3 mm	≤3 mm
Bleeding on probing[a]	<10%	Yes (≥ 10%)
Radiological bone loss	No	No
Reduced periodontium		
Non-periodontitis patient	**Health**	**Gingivitis**
Probing attachment loss	Yes	Yes
Probing pocket depths (all sites & assuming no pseudo pockets)[a]	≤3 mm	≤3 mm
Bleeding on probing[a]	<10%	Yes (≥ 10%)
Radiological bone loss	Possible	Possible

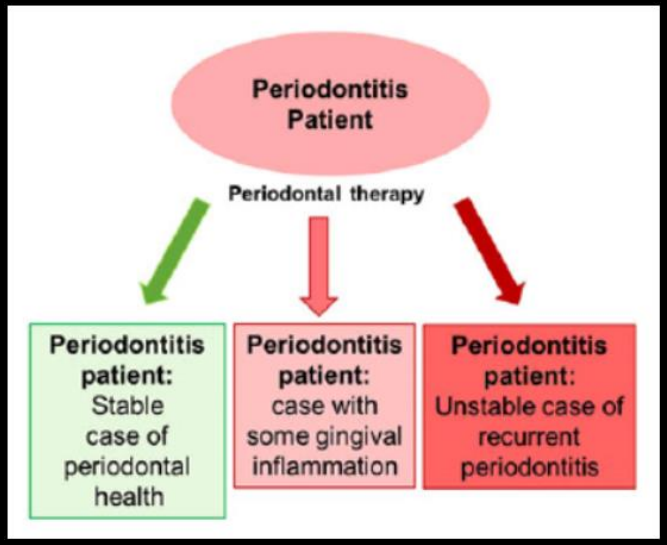
Periodontitis "Case"

Successfully treated stable periodontitis patient	**Health**	**Gingivitis in a patient with a history of periodontitis**
Probing attachment loss	Yes	Yes
Probing pocket depths (all sites & assuming no pseudo pockets)[a]	≤4 mm (no site ≥ 4 mm with BOP)[b]	≤3 mm
Bleeding on probing[a]	<10%	Yes (≥ 10%)
Radiological bone loss	Yes	Yes

Chapple et al. JP 2018

How do I define a Periodontitis Case?

1. Buccal/facial CAL ≥3mm AND pocketing ≥ 3mm is detectable with ≥ 2 teeth, OR
2. Interdental CAL is identifiable at ≥ 2 teeth
3. The observed CAL cannot be attributed to non-periodontitis related origin



Chapple et al. JP 2018

- In a healthy periodontium both soft tissue & hard tissue are harmonious
- Normal architecture can vary slightly but has protective functions such as knife edge margins, interdental papilla filling the embrasure space, pink color and healthy keratinized tissue

- In unhealthy tissues, the gingival margin is rolled, interdental papilla is blunted, erythematous & lack of KT

STAGING & GRADING

PERIODONTITIS: STAGING

Staging intends to classify the severity and extent of a patient's disease based on the measurable amount of destroyed and/or damaged tissue as a result of periodontitis and to assess the specific factors that may attribute to the complexity of long-term case management.

Initial stage should be determined using clinical attachment loss (CAL). If CAL is not available, radiographic bone loss (RBL) should be used. Tooth loss due to periodontitis may modify stage definition. One or more complexity factors may shift the stage to a higher level. See **perio.org/2017wwdc** for additional information.

	Periodontitis	Stage I	Stage II	Stage III	Stage IV
Severity	**Interdental CAL** *(at site of greatest loss)*	1 – 2 mm	3 – 4 mm	≥5 mm	≥5 mm
	RBL	Coronal third (<15%)	Coronal third (15% - 33%)	Extending to middle third of root and beyond	Extending to middle third of root and beyond
	Tooth loss *(due to periodontitis)*	No tooth loss		≤4 teeth	≥5 teeth
Complexity	**Local**	• Max. probing depth ≤4 mm • Mostly horizontal bone loss	• Max. probing depth ≤5 mm • Mostly horizontal bone loss	In addition to Stage II complexity: • Probing depths ≥6 mm • Vertical bone loss ≥3 mm • Furcation involvement Class II or III • Moderate ridge defects	In addition to Stage III complexity: • Need for complex rehabilitation due to: – Masticatory dysfunction – Secondary occlusal trauma (tooth mobility degree ≥2) – Severe ridge defects – Bite collapse, drifting, flaring – < 20 remaining teeth (10 opposing pairs)
Extent and distribution	**Add to stage as descriptor**	For each stage, describe extent as: • Localized (<30% of teeth involved); • Generalized; or • Molar/incisor pattern			

PERIODONTITIS: GRADING

Grading aims to indicate the rate of periodontitis progression, responsiveness to standard therapy, and potential impact on systemic health.

Clinicians should initially assume grade B disease and seek specific evidence to shift to grade A or C.
See **perio.org/2017wwdc** for additional information.

	Progression		Grade A: Slow rate	Grade B: Moderate rate	Grade C: Rapid rate
Primary criteria *Whenever available, direct evidence should be used.*	Direct evidence of progression	Radiographic bone loss or CAL	No loss over 5 years	<2 mm over 5 years	≥2 mm over 5 years
	Indirect evidence of progression	% bone loss / age	<0.25	0.25 to 1.0	>1.0
		Case phenotype	Heavy biofilm deposits with low levels of destruction	Destruction commensurate with biofilm deposits	Destruction exceeds expectations given biofilm deposits; specific clinical patterns suggestive of periods of rapid progression and/or early onset disease
Grade modifiers	Risk factors	Smoking	Non-smoker	<10 cigarettes/day	≥10 cigarettes/day
		Diabetes	Normoglycemic/no diagnosis of diabetes	HbA1c <7.0% in patients with diabetes	HbA1c ≥7.0% in patients with diabetes

Staging

Disease Severity and Complexity of Management			
Stage I: Initial Periodontitis	Stage II: Moderate Periodontitis	Stage III: Severe Periodontitis	Stage IV: Advanced Periodontitis

Grading

Periodontitis grade	Grade A: Slow rate of progression	Grade B: Moderate rate of progression	Grade C: Rapid rate of progression

Why were cha

- New changes followed t
oncology model using a
- Tumor description base
disease severity & Grad
progression
- Changes to classificatio
better way of communi
dentists, hygienists & ot
colleagues

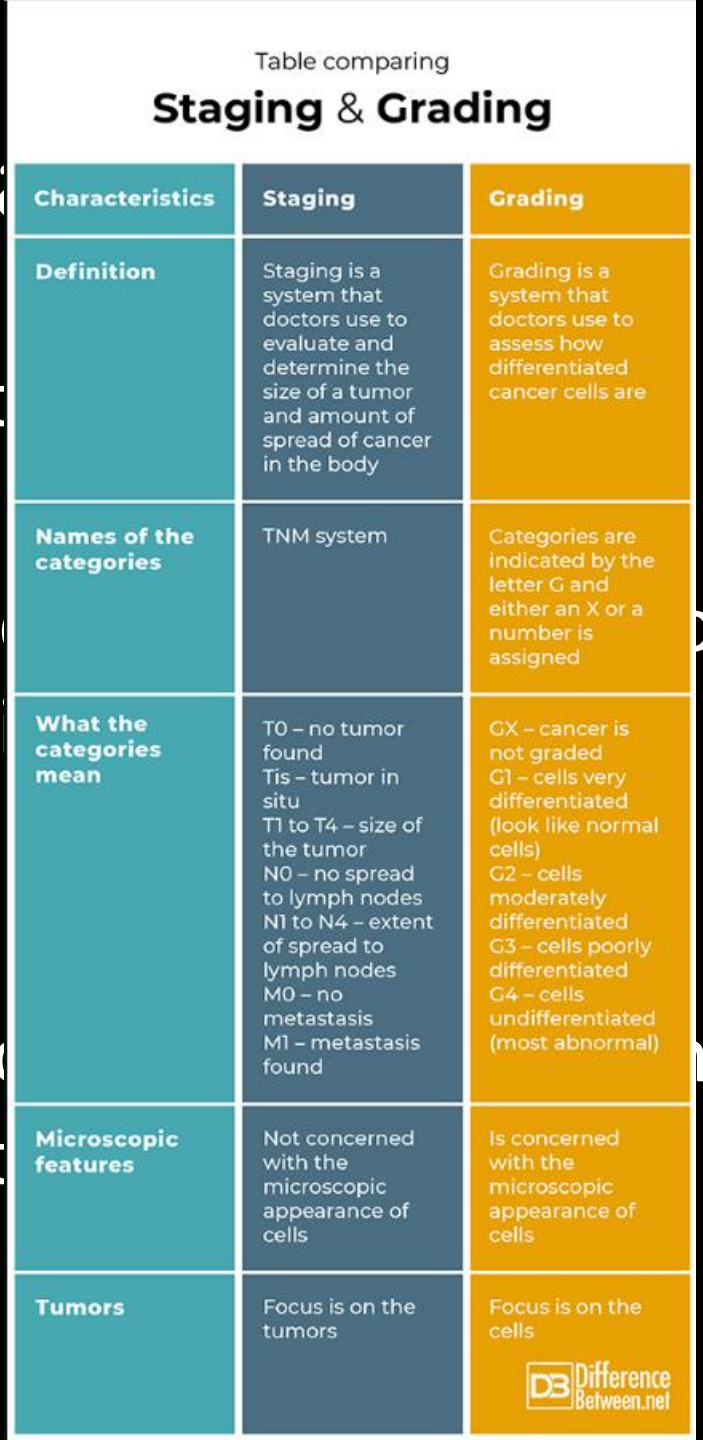


Table comparing

Staging & Grading

Characteristics	Staging	Grading
Definition	Staging is a system that doctors use to evaluate and determine the size of a tumor and amount of spread of cancer in the body	Grading is a system that doctors use to assess how differentiated cancer cells are
Names of the categories	TNM system	Categories are indicated by the letter G and either an X or a number is assigned
What the categories mean	T0 – no tumor found Tis – tumor in situ T1 to T4 – size of the tumor N0 – no spread to lymph nodes N1 to N4 – extent of spread to lymph nodes M0 – no metastasis M1 – metastasis found	GX – cancer is not graded G1 – cells very differentiated (look like normal cells) G2 – cells moderately differentiated G3 – cells poorly differentiated G4 – cells undifferentiated (most abnormal)
Microscopic features	Not concerned with the microscopic appearance of cells	Is concerned with the microscopic appearance of cells
Tumors	Focus is on the tumors	Focus is on the cells

Changes

- Three forms of periodontitis are now defined:

1. Periodontitis (plaque induced etc.)
2. Necrotizing Periodontitis (no ulcerative anymore)
3. Periodontitis as a manifestation of systemic diseases
4. No usage of term Aggressive Periodontitis

Phenotype

- 2017 World Workshop defined term “periodontal phenotype” for the periodontal community

- Term based on gingival phenotype (3D gingival volume such as gingival thickness (GT) & keratinized tissue width (KTW) along with the thickness of the facial and /or buccal bone plate per Kim et al.

- Periodontal phenotype can be altered by environmental factors & clinical interventions such as overhanging restorations, orthodontics or gingival grafting procedures per Jepsen et al.

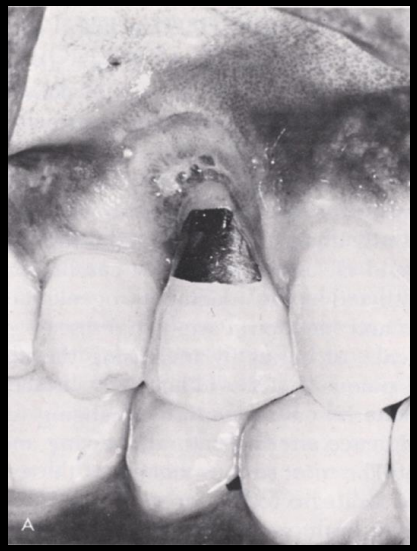
- *Thin scalloped* biotype in which there is a greater association with slender triangular crown, subtle cervical convexity, interproximal contacts close to the incisal edge and a narrow zone of KT, clear thin delicate gingiva, and a relatively thin alveolar bone.
- *Thick flat* biotype showing more square-shaped tooth crowns, pronounced cervical convexity, large interproximal contact located more apically, a broad zone of KT, thick, fibrotic gingiva, and a comparatively thick alveolar bone.
- *Thick scalloped biotype* showing a thick fibrotic gingiva, slender teeth, narrow zone of KT, and a pronounced gingival scalloping.

Cortellini et al. 2017

Why are phenotypes important

- Maxillary bone is much more delicate & keep this in mind !
- When performing restorative procedures in patients with thin scalloped phenotypes be extremely careful when packing cord/ restorations
- In patients with high smile lines this is even more critical!

Soft-tissue damage by the improper use of a rubber dam & clamp or cord packing



Courtesy, R. Yuodelis

Smile Line

- One of the most critical factors in the esthetically conscientious patients
- Important to knowhow to identify the different smile lines of a patient
- High smile line patients needs appropriate intraoral pictures, documentation, realistic expectations & risks and all benefits

High , Low or Average Smile Line?

Classification of Smile:

ACCORDING TO ANTHONY H.L.TJAN, GARY D.MILLER AND JOSEPHINE G.P. –

open smiles were divided into 3 types-

- **High smile**- reveals the total cervicoincisal length of the maxillary anterior teeth and a contiguous band of gingiva.
- **Average smile**- reveals 75% to 100% of the maxillary anterior teeth and the interproximal gingiva only.
- **Low smile**- displays less than 75% of the anterior teeth.





- Take a picture of your patient in repose, and at a natural smile in esthetic cases
- It will help plan your case effectively, in complex cases it will serve as a reference point & help you in the event of any patient miscommunication
- Majority of patients will be average smile line

Non-surgical therapy

- Nonsurgical periodontal therapy involves the control of periodontitis or plaque-induced gingivitis via :

1. Periodontal Instrumentation using scaling and root planing
2. Usage of chemical agents s- minocycline (Arestin), Peridex etc.
3. Rectifying and/ or control of local and systemic contributing factors
4. Effective compliance program with patient's having a daily self care measure
5. Placing patients on PMT (3,4,6 months?)

Goals of Therapy

- To improve the attachment level by eliminating inflammation/ infection
- To decrease the bacterial insult to the patient & create a healthy periodontal environment
- To mitigate the effects of systemic risk factors such as diabetes and smoking
- To alleviate local environmental risk factors

Before

After

Indication of Nonsurgical Periodontal Therapy

- Needed prior to any periodontal surgery in patients with chronic periodontitis & residual pockets
- In certain cases, NSPT may alleviate extent of perio surgery
- To control plaque-induced gingival inflammation
- To mitigate effects of systemic risk factors such as diabetes & smoking
- To alleviate local environmental risk factors

Effect of Plaque

- Plaque on a susceptible agent is the **primary etiological agent** in periodontitis
- Give patients plaque disclosing tabs for self care
- Lang et al. noted that intervals of 48 hours (2 days) are compatible with gingival health, intervals > 48 hours can initiate gingivitis

Nonsurgical Periodontal Therapy

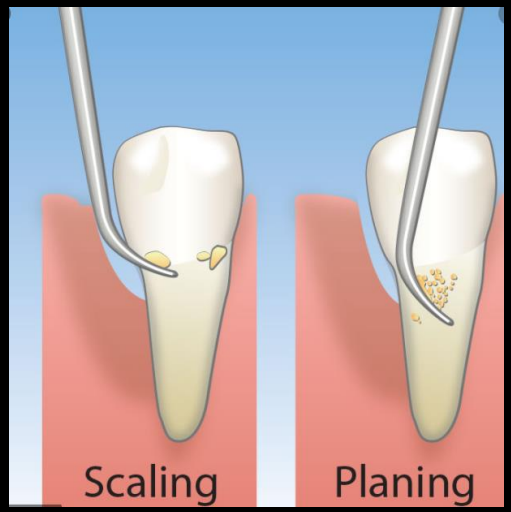
- The removal of supragingival and subgingival calculus along w/ biofilm while preserving the root cementum
- The process of professionally controlling gingivitis and periodontitis by smoothing out the roots
- Periodontal instrumentation is a critical step in nonsurgical periodontal therapy & enables the operator to see patient compliance & motivation

Rationale for Instrumentation

- To arrest the progression of periodontal disease & eliminate inflammation of the periodontium
- To improve effectiveness & maintenance of patient self care
- To prevent the recurrence of the disease process especially during the maintenance period & to stabilize the attachment level

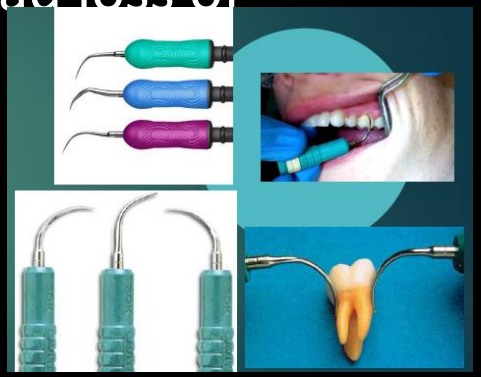
Terminology

- **Scaling**-defined as the instrumentation of the crown & root surfaces
- **Root planning**-defined as the intentional removal of diseased cementum; necessary for the removal of biofilms that can contain toxins & microorganisms



Instrumentation

- Using power instrumentation is the optimal choice over hand instrumentation
- Greater efficacy noted in deplaquing the surfaces of teeth w/ greater effective treatment in furcation, Slimmer tips can reach deeper into periodontal pockets
- However, this instrumentation is not meant to be used in shallow pockets, studies reports that pockets < 2.9mm had loss of attachment per Lindhe et al.



Patient self care

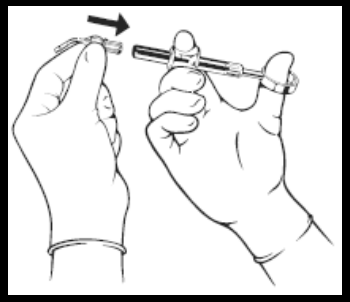
- Provide patient with appropriate oral hygiene instructions (OHI)
- Ask them to show you how they floss or what they use for interproximal plaque removal
- Give them and show them how to use plaque disclosing tabs
- Recommend using a Nimbus toothbrush, if possible, & usage of ADA approved antimicrobial agent and/or Peridex as needed

Chlorhexidine

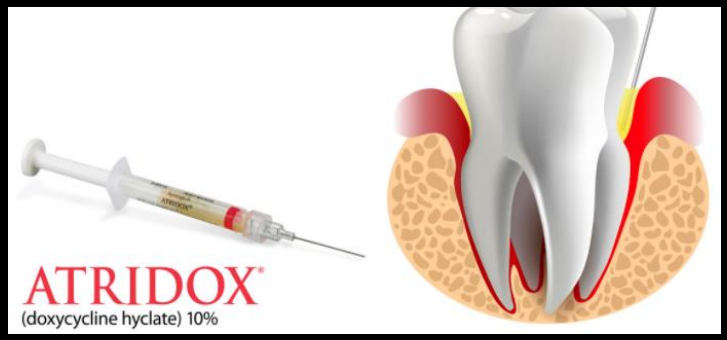
- Active ingredient: .12% chlorohexidine gluconate (salt)
- reduces plaque > than Listerine, 50 - 80% reduction in gingivitis.
- has substantivity due to (+) charge, bonds to hard and soft tissue, as well as bacterial cell walls.
- bactericidal in high concentrations
- lasts up to 24 hours in mouth.
- stains teeth and tongue brown.
- cause slight calculus formation.
- temporary alteration of taste.
- should be last thing you do after brushing and flossing.
- ***use separately from fluoride rinses by 30 min***

Incorporating chemical agents

- Minocycline HCL 1mg Microspheres (Arestin)



- Doxycycline hyclate 10% gel (Atridox)
  Controlled release of antibiotic for 3 weeks



- No brushing or interdental cleaning for 10 day in the treated areas, check for any allergies to tetracyclines (photosensitivity reactions)

Perio Protect®

- Perio Protect® is a custom-fit tray
- This chemical therapy involves a tray delivery of 1.7% hydrogen peroxide gel to chemically debride biofilm from the periodontal pocket
- This alters the pocket's microbiological environment to disrupt biofilm growth after mechanical debridement.
- The AAP has concerns about the promotional claims for the efficacy of this product & believes that they could be misleading to dentists and patients in terms of its clinical relevance

Guidelines for Use

Recommendations of manufacturer

Journal of Periodontology

Hydrogen Peroxide: A Review of Its Use in Dentistry

Milton V. Marshall, Lewis P. Cancro,† and Stuart L. Fischman‡*

In conclusion, adverse irritant effects from exposure to ≤ 3% H_2O_2 were rare. In animals, premalignant lesions and weak enhancement of tumor formation was reported with prolonged use of 30% H_2O_2. Use of solutions of ≤ 3% H_2O_2 in the oral cavity, even for prolonged periods of time should prove safe and beneficial in reducing plaque and supragingival microflora. For periodontal disease, therapeutic delivery of H_2O_2 requires mechanical access to subgingival pockets.

Marshall M, Cancro L, Fischman S. Hydrogen peroxide. A review of its uses in dentistry. J Periodontol 1995;66:786-796.

- Low concentration of hydrogen peroxide decreases plaque & gingivitis, and researchers concluded that mechanical debridement is still needed to treat periodontitis

Periodontal Reevaluation

- After initial SRP done and patient has been given adequate self care instructions and tools, reevaluation must be done ~4-6 weeks
- Sufficient time for healing of epithelium & CT
- Possible root hypersensitivity and gingival recession can occur

Periodontal Re-evaluation

1. Update the medical status with any new medications that patient is taking

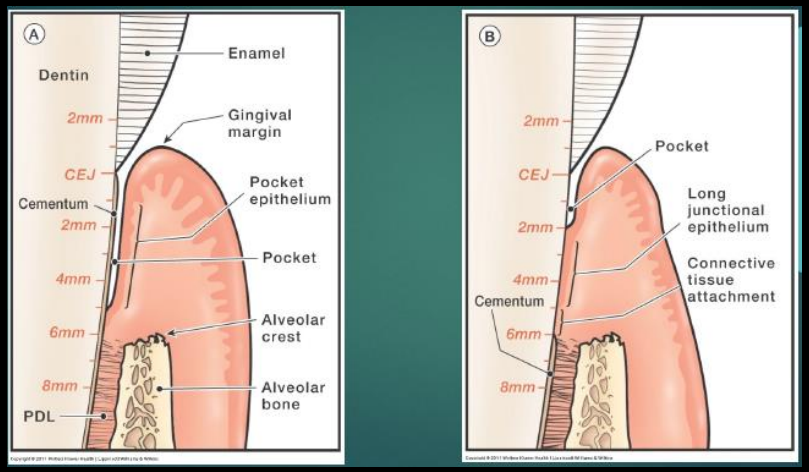
2. Do a thorough periodontal assessment - PD, BOP, CAL, REC etc.

3. Compare results of initial periodontal assessment w/ reeval-& evaluate periodontal pockets

4. Decision needs to be taken for additional periodontal therapy in non-responsive disease sites

Healing after Non-Surgical Periodontal Therapy

- The primary type of healing that occurs after instrumentation via the formation of long junctional epithelium w/ NO new formation of bone, cementum or PDL fibers. This is usually termed as REPAIR
- Prior to instrumentation , pocket has a PD of 6mm (left). After instrumentation tissue healing results in a depth of 2mm



- Repair is different than Regeneration- formation of bone, cementum or PDL fibers

Successful endpoints to root planing therapy

Termeie et al. report that successful endpoints to root planing:

-No bleeding on probing (BOP)

-Decreased mobility of teeth

-Pocket depth < 5mm

-No calculus detection

-Excellent oral hygiene

-Pink & firm gingival tissue consistency

Iatrogenic effects on the periodontium by PERIODONTAL THERAPY

- Tissue sloughing and damage by pressure necrosis of a curette
- Post-scaling periodontal abscess and infection

  - Calculus can get obstructed in a deep periodontal pocket after initial gross scale & polish or ultrasonic debridement

Managing non-responsive deep sites if patient has:

1. Deeper PD
2. Continual attachment loss
3. Systemic risk factors such as diabetes, or smokers
4. Residual roughness from residual calculus and plaque

Should I do additional non-surgical therapy, establish program for periodontal maintenance or need for periodontal surgery??

Legal Ramifications

Legal Responsibilities

Dentist's responsibilities to patient

- Properly licensed
- Skill, care, judgment
- Patient autonomy
- Do not abandon patient
- Refer to specialist
- Standard techniques, materials, drugs
- Reasonable results within reasonable time
- Patient privacy
- Adequate instructions
- Reasonable fees

Patient's responsibilities to dentist

- All instructions will be followed, e.g., postoperative instructions; home-care instructions; cooperation with treatment such as wearing elastics, controlling diet, conducting oral hygiene, etc.
- • Appointments will be kept.
- • Fees for services will be paid.
- • Patients will conform to generally accepted modes of behavior.
- • Patients will be truthful regarding their health history and other administrative inquiries.

- Negligently performing dental work.
- Failure to diagnose or treat a dental condition.
- Any intentional misconduct.
- Failure to properly detect an oral disease or malformation.
- Improper sterilization of dental or surgical utensils.
- Installation of defective or shoddy dental products.
- Failure to regularly update medical history. A dental treatment provider should update a patient's medical history at every visit. If there are no changes, the care provider should note that in the chart as well, especially if the patient has a complicated medical history. The provider should complete a new medical history about every three years.
- Failure to detect oral pathology. Oral pathology focuses on the diagnosis and treatment of oral diseases, including oral cancer. Overlooking a potentially malignant lesion or failing to diagnose oral cancer is a cause of many malpractice claims.
- Failure to detect periodontal disease. Periodontitis, or gum disease, can lead to tooth loss due to the destruction of the surrounding tissue. It may also contribute to heart and lung diseases. When a dental professional fails to examine for gum disease over an extended time, the disease goes undetected and untreated.

INJURY CLAIM COACH

- Common Types of Dental Malpractice
- The types of dental treatments most involved in malpractice lawsuits are:

- **Extractions:** Problems from getting a tooth pulled include injections, nerve damage, and perforations of nearby mouth tissues and sinuses.
- **Dental Infections:** Infections following dental procedures can lead to blood poisoning, brain abscesses, and cardiac complications. Infections may require hospitalization and surgical intervention.
- **Endodontic Procedures:** Injuries from root canals and similar endodontic procedures include infections, sinus and nerve damage, blocked blood vessels, and dental instruments left in the canal.
- **Dental Implants:** Patients have been injured by infections, lost implants, and inadequate follow-up care.
- **Crowns and Bridges:** Improperly placed crowns and bridges can result in unsightly gaps, the inability to chew properly, infections, and more.
- **Periodontal Disease:** Malpractice lawsuits typically stem from the dentist's failure to adequately diagnose and treat the disease.
- **Orthodontics:** Badly installed braces and other corrective treatments can result in multiple tooth loss, infections, and root complications.
- **Dental Anesthesia:** Wrongfully administered anesthesia is the most common cause of dental malpractice resulting in death to adult and child patients.
- **Oral Cancer:** A dentist's failure to timely recognize mouth cancers can be deadly to the patient.

When do we need surgery?

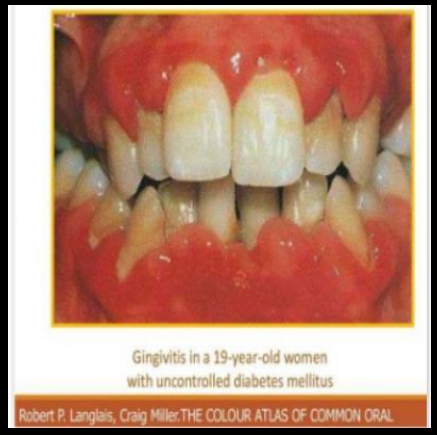
- Deep pockets after initial non-surgical therapy, PD > 5mm
- Lack of KT with abherrent frenum
- Severe recession causing patient discomfort or esthetic issues
- Teeth that have a hopeless prognosis, need ext.
- Implant placement if needed
- Excessive soft tissue growth, preprosthetic surgery

Contributing factors of periodontitis

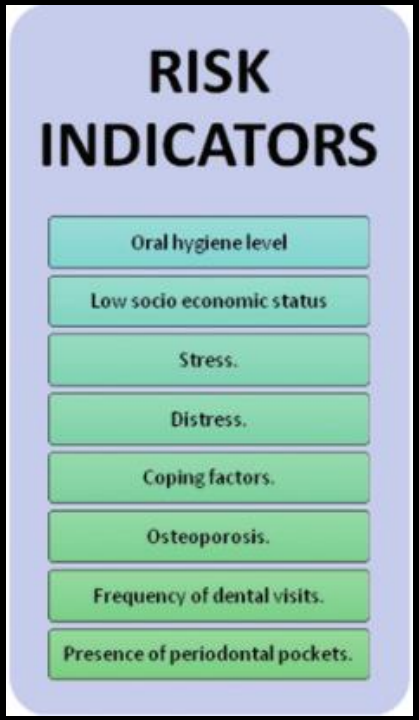
- Risk factors-characteristics of an individual that place them at an increased risk of contracting a disease (longitudinal studies)
- Diabetes and Smoking are risk factors for periodontal disease
- Numerous studies have shown a strong and direct relationship b/w both
- Per Grossi et al. smokers have 18X more periodontal pathogens vs nonsmokers & 3x > bone loss and attachment loss in diabetic patients

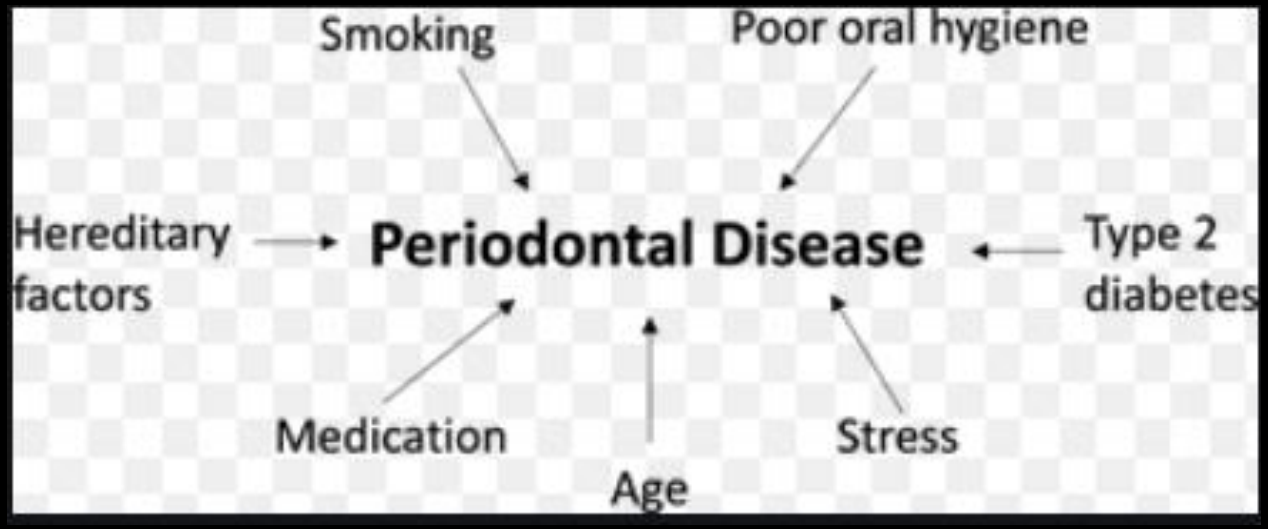
Risk Factors

- *Local risk factors are defined as anything that can influence the periodontal health status @ a site or sites w/ NO known systemic effects per Matthews et al. (2004)*
- Plaque accumulation necessary to induce gingival inflammation is variable in different individuals'
- Factors such as local risk factors (predisposing tooth anatomical factors) & systemic risk factors (smoking, metabolic factors, nutritional factors, pharmacological agents etc.) have an integral role in disease progression



- Risk Indicators are possible or probable risk factors that have been identified in cross sectional studies but not confirmed via longitudinal studies (long term data is needed)





The Link Between Periodontal Disease & Systemic Inflammatory Diseases: A Risk Continuum

Casey Hein & Associates

Local Risk Factors

- Certain individuals are more prone to periodontal disease regardless of systemic issues
- Other factors such as stress, genetics & cytokines are also important in the host response
- However, certain anatomical features of teeth can be important in plaque retention
- Studies have shown that 50% of the variance in disease in the population is attributed to genetic variance

Furcation

- Defined as the “anatomic area of a multirooted tooth where the roots diverge, and furcation invasion refers to the “pathologic resorption of bone within a furcation” (American Academy of Periodontology 2001)

Classifications

Glickman (1953)

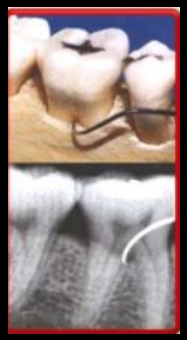
Grades the furcation based on the degree of horizontal involvement

Grade I- Incipient furcation, suprabony pocket, intact interradicular bone

Grade II- cul-de-sac, horizontal component & loss of interradicular bone

Grade III-communicating or through and through furcation, bone not attached to dome of furca

Grade IV through and through furcation w/ soft tissue recession w/visible furcation



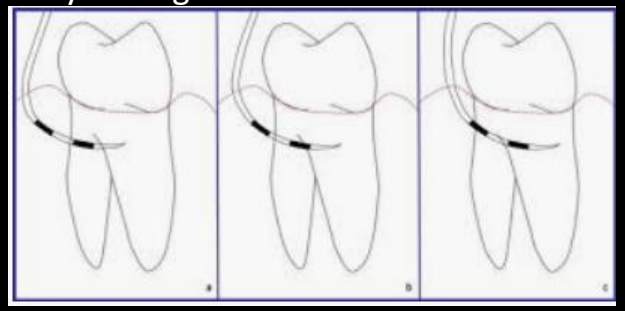
Hamp Furcation Index (1975)

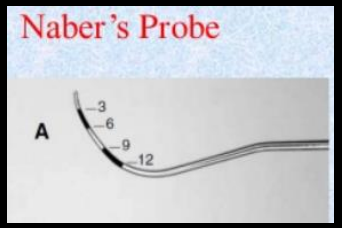
Furcation grade based on the degree of horizontal involvement. Depending on how far the probe reaches horizontally inside the furcation

Degree I – Horizontal loss of periodontal tissue support < 3mm , not extending beyond 1/3 of the width of the tooth

Degree II – Horizontal loss of support >3mm but NOT encompassing the total width of furcation area, within 2/3 the width of the tooth

Degree III –Horizontal “through & through” destruction of periodontal tissue in furcation area the involvement is all the way through the entire width



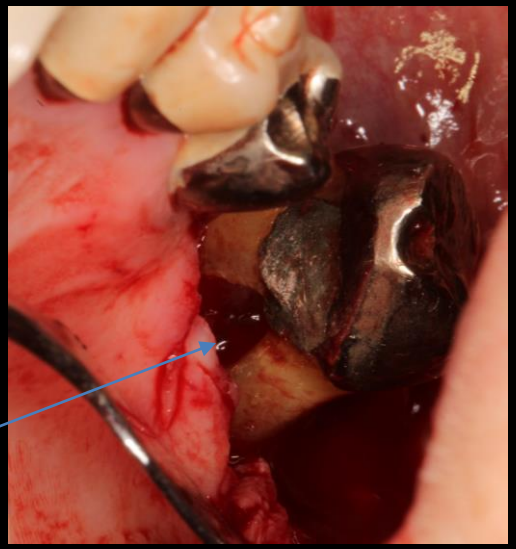


Tx for type I furcation: SRP,

II furcation: SRP/furcation sx

III furcation: root resection , tunnel preparation or extraction

- What can be done in these cases? Deep pocket #14, used as an abutment for partial and pt. has limited finances & can't afford implants



Grade 3 furcation

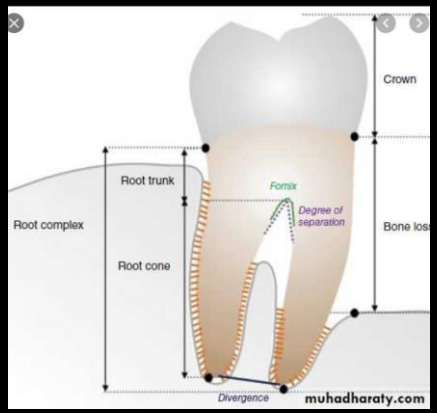
Case

c/c “I really want to save my tooth because I spent a lot of money, and I don’t want an implant”

- No bone and all granulation tissue, Nabers probe used and no bone present vertical or horizontal. Prognosis #14: hopeless

Root & Furcation Anatomy

- Root complex-portion of tooth that is located apical of the CEJ and it can be divided into 2 parts: the root trunk and the roots (cones)
- Furcation is the area between the individual roots. Furcation entrance is the transitional area that is present between the undivided and the divided part of the root & Fornix is the roof of the furcation
- Degree of separation is the angle of separation between the two roots while divergence is the distance between the two roots
- The furcation is an area of COMPLEX anatomic morphology (Bower 1979) that is difficult or in some cases impossible to debride routine periodontally instrumentation (Metzler 1991)
- The primary etiological factor in the formation of defects at the furcation is dental plaque per Ammons et al.



Root Concavities

Bower 1979A (UNIVERSITY of MICHIGAN)

- Study done to investigate which morphologic features might influence plaque control & root preparation in this area along w/ modifying role of cementum in altering root contour. Two Part Study

PART I

Maxillary Molars (114 examined)

-Concavities in 94% MB root (0.3mm concavity depth), 31% DB roots (0.1mm deep) & 17% P root (0.1mm deep)

Mandibular Molars (103 examined)

-Concavities in 100% Mesial root (0.7mm concavity depth) and 99% distal root (**0.5mm deep**)

-Both concavities makes area difficult to clean with inadequate root preparation from existing technique, and straight &rigid cleaning devices in removing all plaque and serves as PLAQUE retentive factor

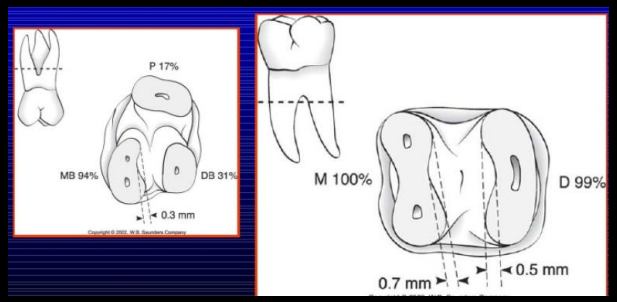



FIGURE 4. Use of reticle to measure concavity of the furcal aspect of the mesial root of a mandibular first molar tooth.

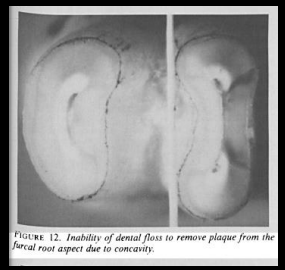


FIGURE 12. Inability of dental floss to remove plaque from the furcal root aspect due to concavity.

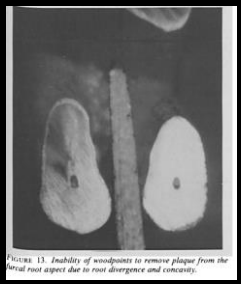


FIGURE 13. Inability of woodpoints to remove plaque from the furcal root aspect due to root divergence and concavity.

Furcation

Bower (1979B)- study done in maxillary & mandibular molars to investigate whether furcation morphology may influence instrumentation using curettes

-81% of furcation have an orifice of 1mm or less & 58% of time it is ≤0.75mm , blade width of common periodontal curettes is 0. 75mm-1.0mm whatever the type & manufactures of the instrument.

These instruments are UNLIKELY to clean furcation entrance in clinical situations.

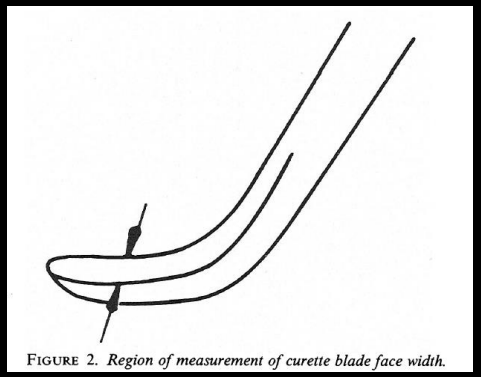
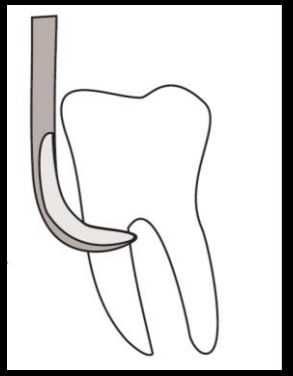
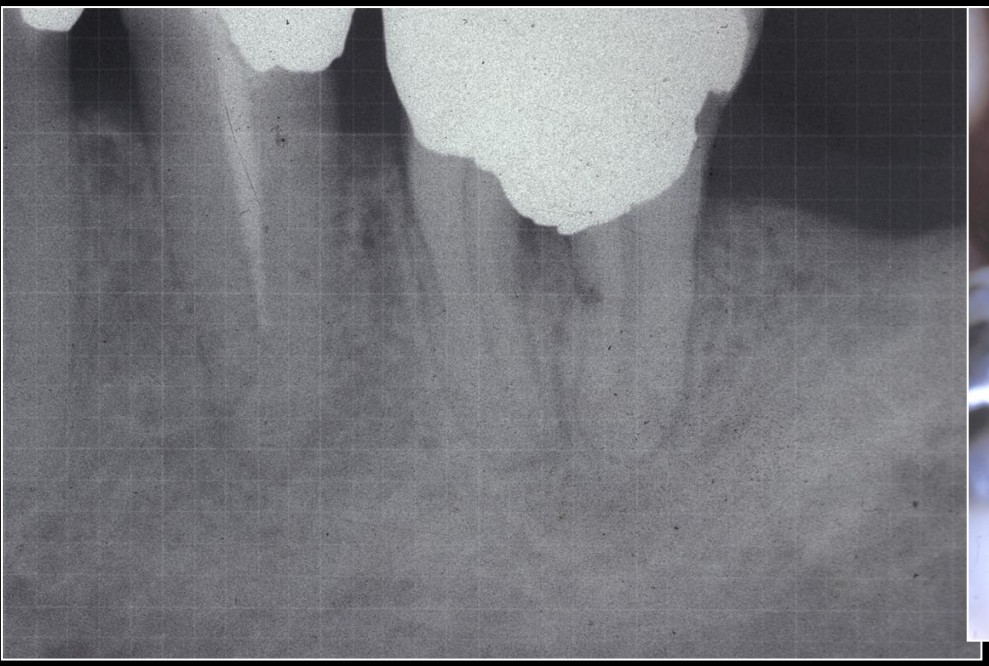
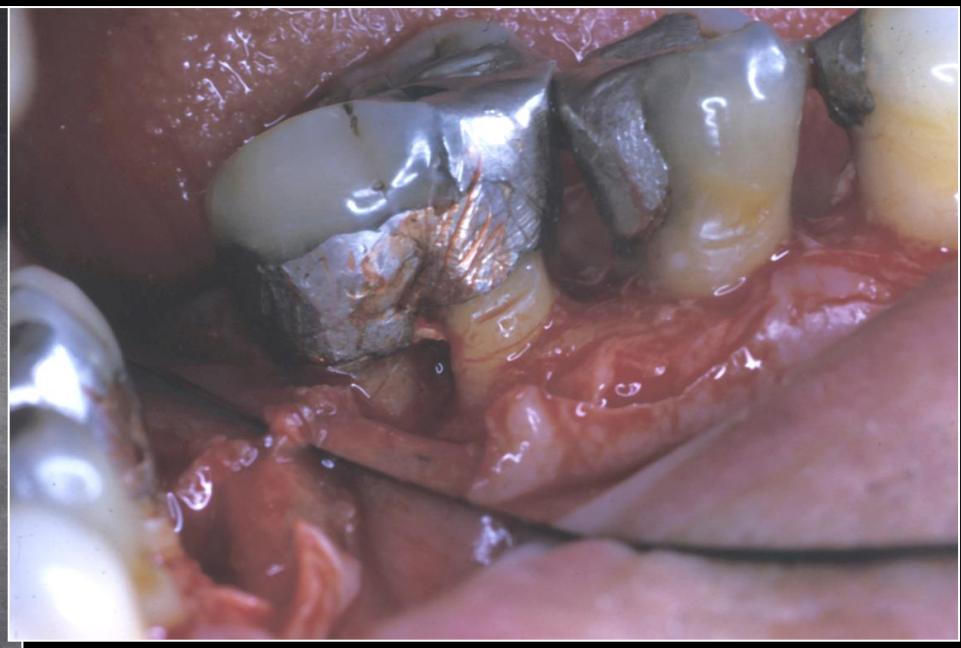


FIGURE 2. *Region of measurement of curette blade face width.*



- Ultrasonic (smaller) tip is better option than usage of Gracey curette in grade II or III furcation





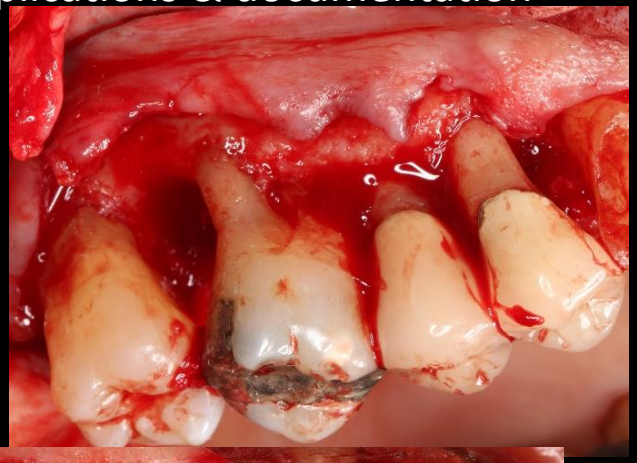
Courtesy of Dr Silston

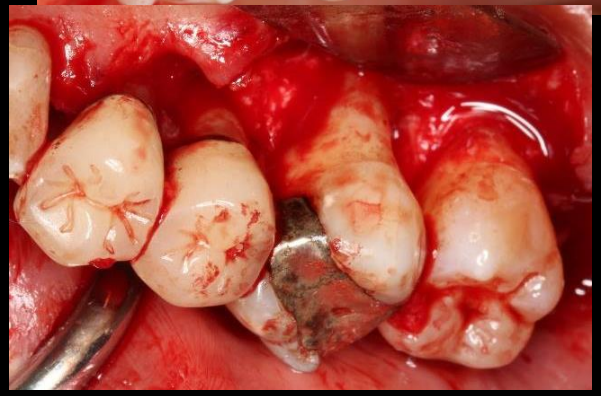
Case

C/C “I have slight discomfort on my upper RHS, and it is very sensitive, can we try to save my tooth”

Surgery

- Pt has been on periodontal maintenance and has had regular SRP for over 5 years
- Topography of bone follows soft tissue, no bone on distal aspect, can't regenerate
- Prognosis questionable – hopeless
- Patient must be informed prior to surgery possible complications & documentation





Surgery

1 week follow up

1 month follow up

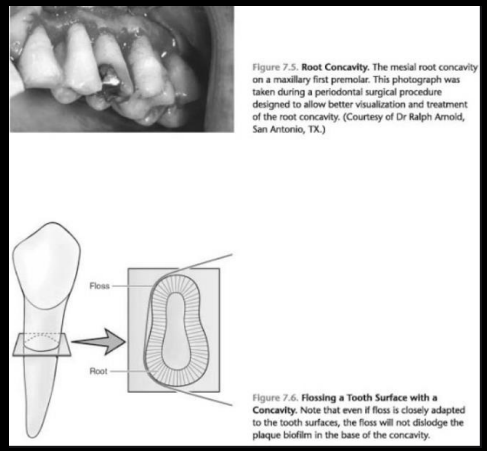


Figure 7.5. **Root Concavity.** The mesial root concavity on a maxillary first premolar. This photograph was taken during a periodontal surgical procedure designed to allow better visualization and treatment of the root concavity. (Courtesy of Dr Ralph Arnold, San Antonio, TX.)

Figure 7.6. **Flossing a Tooth Surface with a Concavity.** Note that even if floss is closely adapted to the tooth surfaces, the floss will not dislodge the plaque biofilm in the base of the concavity.

Maxillary first premolar

- Booker et al. study showed the complexity of the anatomy of the maxillary first bicuspid. Results show attachment loss around maxillary first PM involves surfaces which are concave, concave surfaces make plaque removal extremely challenging

Concavity more prominent in 2 rooted pre-molars and was seen 100% on mesial aspect

- Zhao et al. (**2014**)- root concavities of the first premolars were associated w/ periodontal disease & type of interproximal alveolar bone defect . Analysis done w/ CBCT

-Root concavity had a relationship to the type of osseous defect:

-Concluded root concavity is an important contributing factor in periodontal disease in maxillary first bicuspids.

Fig. 2. Cone beam computed tomography images of the first premolar with different patterns of bone defect. (A-a) Buccal view of mesial crater no. 34; (A-b) mesial view of no. 34 bone defect; (B-a) buccal view of distal ramp no. 44; (B-b) distal view of no. 44 bone defect; (C-a) buccal view of distal plane no. 44; (C-b) distal view of no. 44 bone defect.

How to clean around root concavities

- Due to pronounced concavity, floss cannot penetrate and remove any plaque adhered to the depression
- Interdental brushes or proxy brushes are more ideal in these cases

Anatomy- Cervical Enamel Projections (CEP)

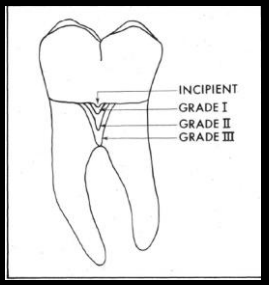
- Defined as apical extension of coronal ectopic enamel apical to the level of normal CEJ w/ a tapering form & extending towards or into the furcation
- Existence of CEP inhibits CT attachment & management of furcation difficult per Blieden et al.
- Masters and Hoskins (1964) classified CEP's

Grade I: slight extension from CEJ of the tooth to furcation entrance

Grade II: approaches entrance but does not enter the furcation (no horizontal component)

Grade III: extends horizontally into furcation

Fig. 5. Grade III cervical enamel projection on a mandibular first molar. This projection acts as a lip at the furcation entrance. Together with the mesial groove on the distal root, these anatomic anomalies compromise plaque removal.



Enamel Pearls (E.P.)

-Ectopic enamel droplets found in multirooted teeth during root development allows it to differentiate into ameloblast & lay down enamel

-Prevents connective tissue attachment & promote periodontal lesions by acting as plaque retentive structure

-Asians tend to be affected more often, and males > females

-Case Report associated with pain on lower RHS & > PD, >BOP, suppuration & possible diagnosis gingival abscess or calculus.

EP located after surgical exposure & ext. performed. Correct diagnosis is needed based on anatomical variations

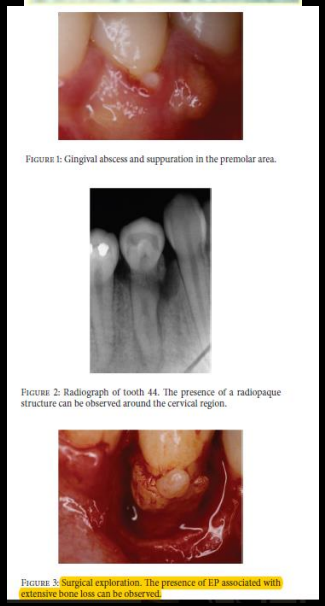


FIGURE 1: Gingival abscess and suppuration in the premolar area.

FIGURE 2: Radiograph of tooth 44. The presence of a radiopaque structure can be observed around the cervical region.

FIGURE 3: Surgical exploration. The presence of EP associated with extensive bone loss can be observed.

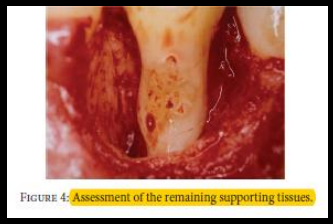


FIGURE 4: Assessment of the remaining supporting tissues.

Case Reports

- Rocha et al. (2018)- used CBCT in case study to aid in diagnosis EP b/c lack of precision from PA. Associated w/periodontal or PA lesions w/angular bone loss along root surface

Confused w/ dental calculus, removal is key to lower biofilm. EP which are exposed to oral environment need surgical treatment such as odontolplasty, tunneling, root separation, resection or extraction. CBCT is important in attaining proper diagnosis of EP

- Versiani et al. (2013)- EP located generally in furcation area. 2,352 teeth sample 0.74% of teeth EP (18/2532) w/majority found in max second & third molars w/NO diff in terms of diameter, volume & EP surface area. Concluded EP imitate endo-perio lesion & it a secondary etiological factor in perio breakdown

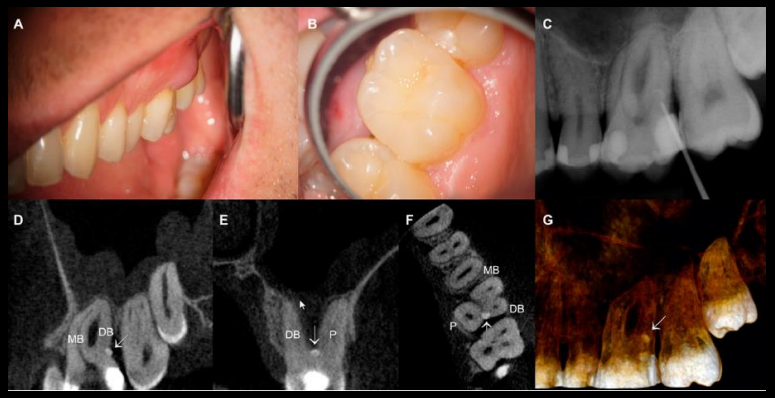
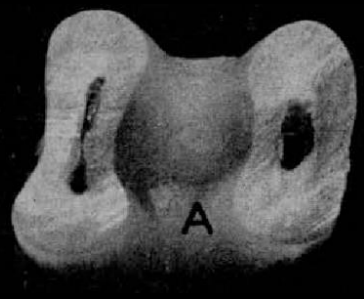


Table 1 Distribution of EPs according to the type of tooth

Tooth type	*One EP*	*Two EPs*	*Number of teeth*	*Percentage*	*Number of EPs*
Maxillary second molar	8	1	9	50.0	10
Maxillary third molar	4	4	8	44.5	12
Mandibular second molar	1	—	1	5.5	1
Total	13	5	18	100.0	23

EP, enamel pearl.

Intermediate Bifurcation Ridge (IBR)



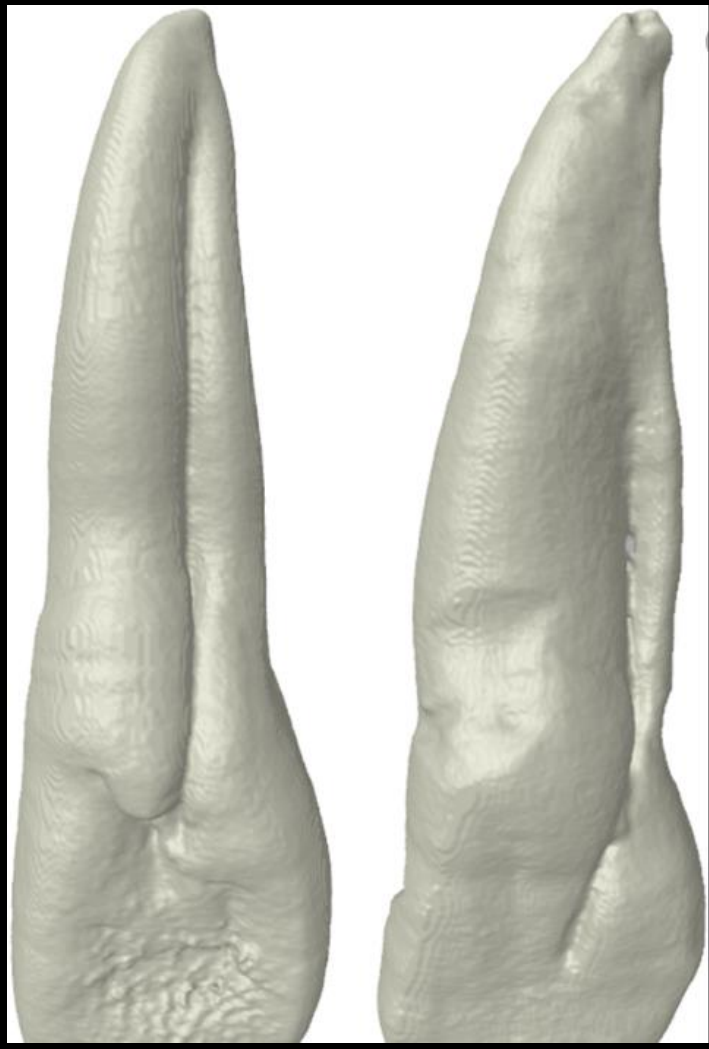
- Everett (1958) first to describe incidence of bifurcation ridges
- IBR connect the mesial & distal roots and are composed primarily of cementum per Matthews et al.
- IBRs are considered a cemental anomaly and appears as a distinct ridge
- IBR offers a good location for retention of subgingival dental plaque leading to difficulties in debridement

Palatoradicular grooves (PRG)

- Developmental anomaly defined as a “ developmental groove present on the palatal aspect of the maxillary incisor”

- Oehelers 1958 described condition as radicular invagination in upper lateral incisor in a Chinese female patient & Lee et al.

- Prevalence rate of 2.5-8.5% located on lingual surface of maxillary lateral incisor, grooves extend over the cingulum & continue apically to the root surface per Schwartz et al.



PRG


Fig. 9. Periodontal pocket associated with palatal groove on mesial of central incisor; without probe in place (a), with probe in place (b).

- Matthews et al. report that PRG are grooves that begin in central fossa across the cingulum & extend apically for various directions & distances.

- Grooves act as “funnels” for plaque retention b/c area difficult to clean for pt. and clinician. PRG w/apical extension has poor prognosis

- Al-Hezaimi et al. (2009)-case report done of radicular groove tx using endodontics, intentional replantation & Emdogain therapy in 15 yo Hispanic female complaining of pus discharge& PRG detected from crown to gingival sulcus with PD 13mm

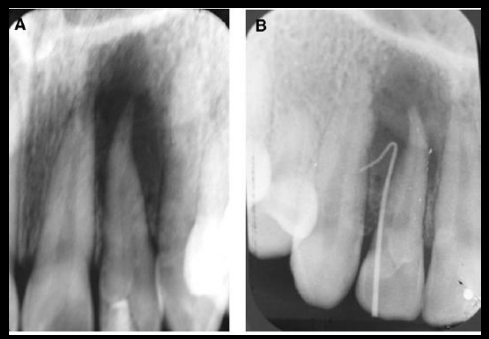



Fig. 2. Clinical view of the intentionally extracted tooth Emdogain is applied to the radicular groove and root surface before replantation.

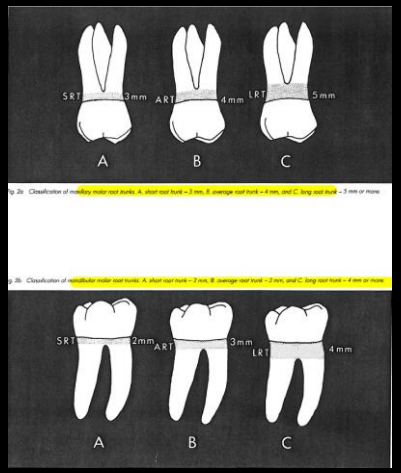

Fig. 3. Four-year follow-up radiograph showing substantial decrease in size of the periradicular radiolucency. The tooth is asymptomatic, and the patient is comfortable.


Fig. 4. Four-year follow-up, periodontal probing depth showed substantial reduction from 13 mm to 3 mm.

Anatomical Features of Teeth

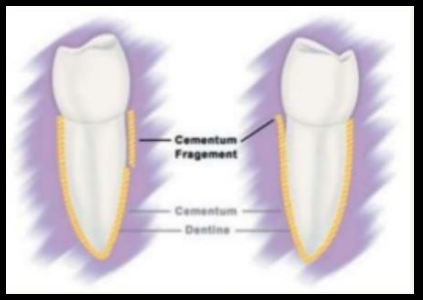
Tooth	Anatomic feature (ref.)	Prevalence (ref.)
Maxillary incisors	Palatal groove	0.79 (5)–21% (51)
	98% all grooves found in lateral incisors	
Maxillary first bicuspids	Root trunk length; averages 4–14.6 mm (57)	
	Furcal concavity on palatal aspect of buccal root	62% (57)
	Mesial root concavities	100% (14)
	Furcation entrance diameter <0.75 mm	57% (15)
Maxillary molars	Furcation entrance diameter <0.75 mm	63% (15)
	Root trunk length; averages	
	Mesial: 3.5 mm (99)–4.2 mm (15)	
	Buccal: 4.0 (99)–4.8 mm (15, 93)	
	Distal: 3.3 (12)	
	Cervical enamel projections	32.6% (112)
Mandibular molars	Furcation entrance diameter <0.75 mm	50% (15)
	Root trunk length; averages	
	Buccal: 2.4 mm (15)–3.14 mm (70)	
	Lingual: 2.5 mm (15)–4.17 mm (70)	
	Cervical enamel projections	
	First molar	80.4% (52)
	Second molar	48.4% (52)
	Bifurcation ridges	65.5% (52)–76% (18)

Matthews et al. (2004)



Ochsenbein 1986

Cemental Tear



- Defined as a detachment of cementum from the root with the separation of cementum can be complete or incomplete.
- Complete separation involves the displacement of a fragment into the PDL while incomplete separation involves the cementum fragment partially attached to the surface of the root.
- Apicocoronally location of cemental tear was noted by using radiographic images per Ishikawa et al., all patients in study were over 50 years

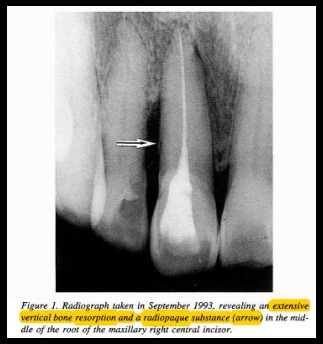


Figure 1. Radiograph taken in September 1993, revealing an extensive vertical bone resorption and a radiopaque substance (arrow) in the middle of the root of the maxillary right central incisor.

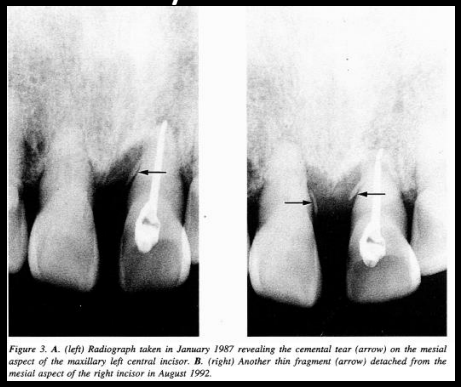


Figure 3. A. (left) Radiograph taken in January 1987 revealing the cemental tear (arrow) on the mesial aspect of the maxillary left central incisor. B. (right) Another thin fragment (arrow) detached from the mesial aspect of the right incisor in August 1992.

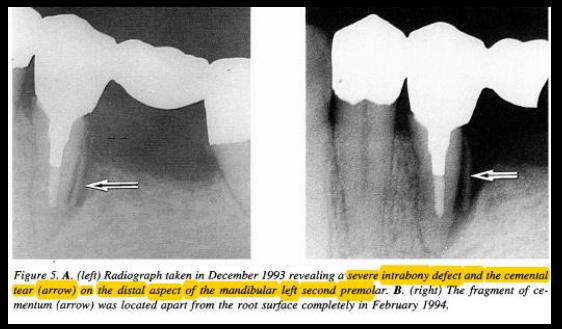


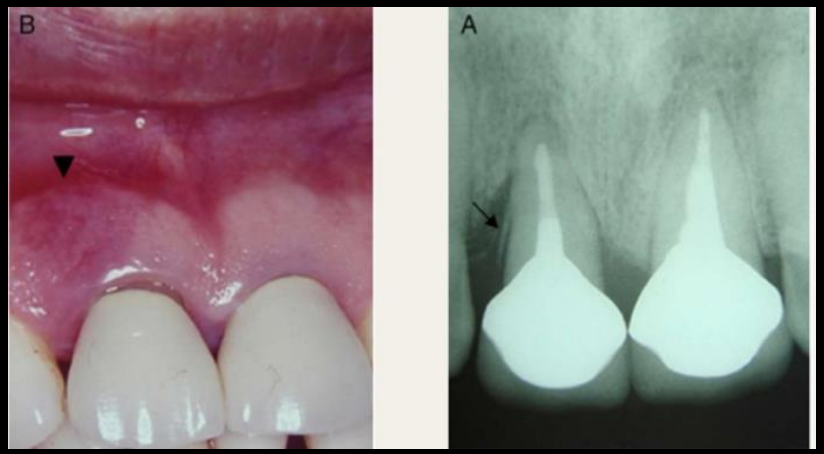
Figure 5. A. (left) Radiograph taken in December 1993 revealing a severe intrabony defect and the cemental tear (arrow) on the distal aspect of the mandibular left second premolar. B. (right) The fragment of cementum (arrow) was located apart from the root surface completely in February 1994.

Cemental Tear (CeT)

- Ishikawa (1996) -CeT associated with localized attachment loss due to aging or occlusal strain where superficial layer of cementum is removed from side of the roots

- Cemental tears are painless, detected clinically with very localized deep periodontal pocket and radiograph with a localized radiolucency surrounding a “prickle-like body”, mistaken for calculus

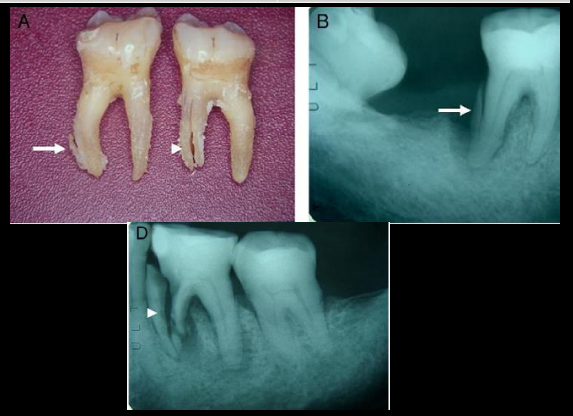
- Clinical characteristics associated w/ cemental tears are tissue swelling, localized deep pockets & periapical lesion TX: Apical Surgery, Extraction & Intentional Replantation



Cemental Tear

Author	Age (Sex)	Tooth type	Type of study	Radiographic finding	Biopsy	Findings and suspected factors
Haney et al (1992) (8)	79 (F)	35	Case report	Yes	Yes	Vital tooth, over bridge abutment tooth, with vertical bony defect. Occlusal overloading or trauma and age are factors
Ishikawa et al (1996) (5)	72 (M)	11	Case report	Yes	No	5/6 fractured over cervical and 1/6 fractured in apical area, aging and occlusal strain are factors.
	55 (M)	11		Yes	No	
	69 (M)	11 & 21		Yes	No	
	68 (F)	25		Yes	Yes	
	67 (M)	35		Yes	Yes	
	54 (M)	36		Yes	No	
Leknes (1996) (1)	None	17 teeth	Observational study	Yes (partly)	Yes (1)	8/17 with vital pulp, 9/17 with prior endodontic treatment. Rapid attachment loss noted.
Müller (1999) (7)	50 (F)	43	Case report	Yes	No	Rapid periodontal breakdown with deep pocket and three-wall bony defect. Occlusal trauma due to clenching.
Harrel and Wright (2000) (17)	63 (F)	35	Case report	Yes	Yes	Deep pocket, sinus tract, traumatic occlusion, marked attrition
Camargo et al (2003) (9)	61(M)	21	Case report	No	No	Deep pocket and sinus tract, failure of prior endodontic treatment, apical cementum tear.
Marquam (2003) (12)	71(M)	21	Case report	No	No	Asymptomatic, nonbleeding, narrow deep pocket. Trauma, occlusal overloading, thicker cementum, age.
Chou et al (2004) (4)	52 (M)	15	Case report	Yes	Yes	Pain and deep pocket with cervical cemental tear. Occlusal trauma, age, impaired tissue repair capacity, 43% cases with prior endodontic treatment
Lyons et al (2005) (16)	31 (M)	12	Case report	No	No	With endodontic treatment.
Tulkki et al (2006) (2)	79 (F)	45	Case report	Yes	Yes	Vital tooth with deep pocket and periodontal bone loss. Age, trauma or trauma from occlusion.
Stewart and McClanahan (2006) (10)	22 (M)	11	Case report	No	Yes	Trauma history, sinus tract, failure of prior endodontic treatment.
Tai et al (2007) (3)	79 (F)	21	Case report	Yes	Yes	Age, heavy occlusal force, prior failed endodontic treatment.

Clinical finding	Predisposing factor
Deep periodontal pocket	Age
Rapid attachment loss	Occlusal overloading/trauma
Vertical bony defect	Impaired tissue repair
Prior endodontic treatment	Failure of endodontic treatment
Sinus tract	Marked attrition
	Thicker cementum



- Lin et al. (2011) report that unnecessary RCT can be avoided if proper vitality test and radiographs are evaluated along w/ knowledge of pre-disposing factors for cemental tears

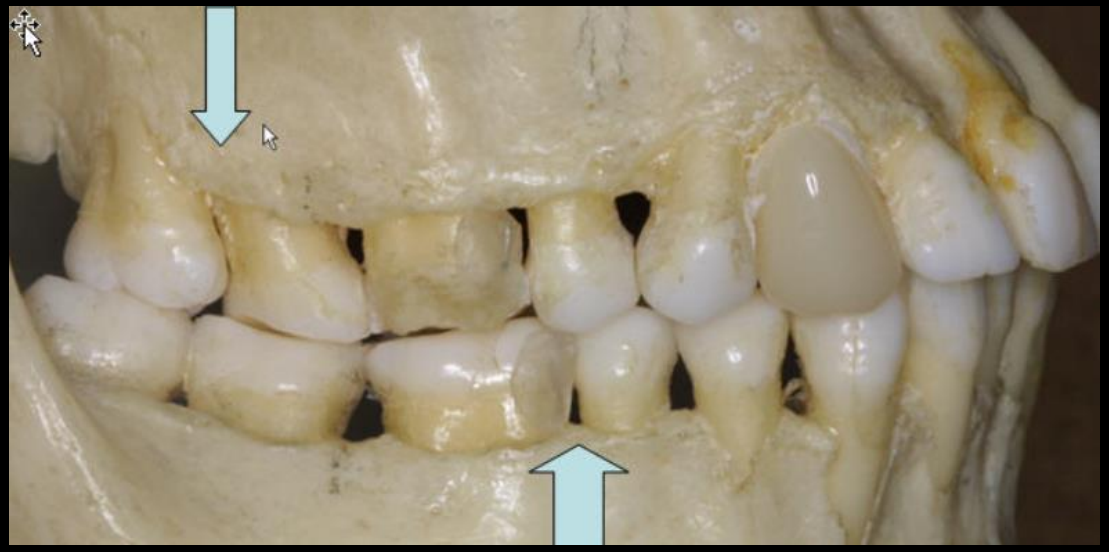
- Maxillary or mandibular incisors (76.1%), men (77.5%) & pts older than 60 yo most affected from cemental tears

Root Proximity (RP)

- Concept of RP introduced by Trossello et al. to describe the clinical condition in which insufficient distance defined as ≤ 1.0mm exists between roots of adjacent teeth to maintain periodontal health

RP determinations as Favorable > 1mm bone b/w roots & Unfavorable <1mm

- Human histological study per Heins et al. (1986) showed quality and quantity of the interproximal septa are determined in part by interradicular distance (IRD).



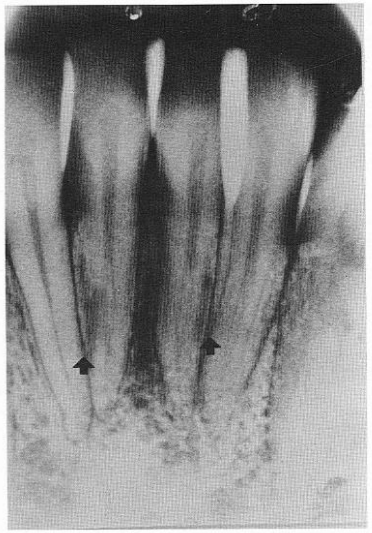


FIGURE 6. *Root proximity. Interdental bone between incisor roots is less than 1 mm.*

TABLE V. *Radiographic Findings*

Expressed as % of total areas observed.

	Control group	Treated group
1. Bone Loss	19.2	23.1
2. Furcation	6.4	5.1
3. Root Proximity	13.4	11.4
4. Root Resorption	2.3	16.7*

* $P < 0.001$.

Malocclusion & Crowding

- Maloposed teeth, crossbite & crowding of maxillary & mandibular anterior sextant associated w/ increased plaque retention, gingivitis, greater PD, bone loss & CAL per Artun et al. (1987), Ainamo (1972)

- Per Matthews et al. (2004) crowding leads to poor OH w/ > plaque accumulation & > gingival inflammation, but if interproximal spa

-However, patients w

- Alsulaiman et al. (sease progression in ant teeth. Long

- Concluded that certa r spacing, mandibular incisor mil moderate irregularity & mandibu rogression. GPs should provide approp

Fig. 1. Grade I furcation involvement of maxillary second molar, grade II furcation involvement of first molar. The root proximity between these teeth makes access extremely difficult.

Third Molars

- Partially impacted third molars exposed to oral environment have greater susceptibility to periodontal infection & > attachment loss
- Kugelberg et al. report that periodontal healing of second molars after third molar removal comes with infrabony defects & deep periodontal pockets especially in patients older than 26 years w/ mesioangular or horizontal impactions & pre-existing periodontal pockets
- Camps-Font et al. (2018) assessed regenerative techniques that were the most effective for prevention of periodontal defects after 3rd molar extractions & compared these procedures w/ spontaneous healing of the socket.

-Lack of consensus of favorable outcomes of using regenerative materials, use of biomaterials increases risk of infections especially when there is NO adequate wound closure. Platelet concentrate (PC) MAY have some benefit in reducing complications such as alveolar osteitis & improved soft tissue healing

Periodontal pocket

Third Molars

Tooth #1 – non-functional occlusion with or without decay
Tooth #16 – non-functional occlusion with or without decay
Tooth #17 – mesially-tipped partial bony impaction
Tooth #18 – deep distal decay that extends both to the pulp and sub gingivally; also, with a deep periodontal pocket on distal
Tooth #31 – deep distal decay that extends both to the pulp and sub gingivally; also, with a deep periodontal pocket on distal
Tooth #32 – mesially-tipped partial bony impaction

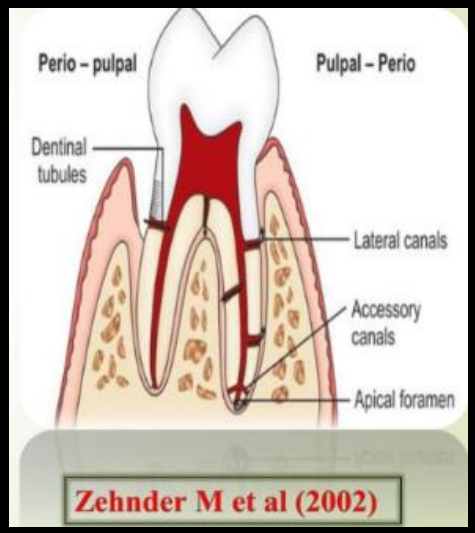
Accessory Canals

- Inflammatory process is influenced & maintained by bacterial by products that can reach the periodontium via accessory canals

- Per Gutman (1978) accessory canals were demonstrated in the furcation region in 28.4% of total sample (102 extracted molars) with 29.4% in mandibular molars & 27.4% in max molars

- Communication between the pulp chamber was noted via dentinal tubules

- Literature consensus if that there is great deal of intercommunication b/w pulp & periodontium via accessory canals



Vertical Root Fracture (VRF)

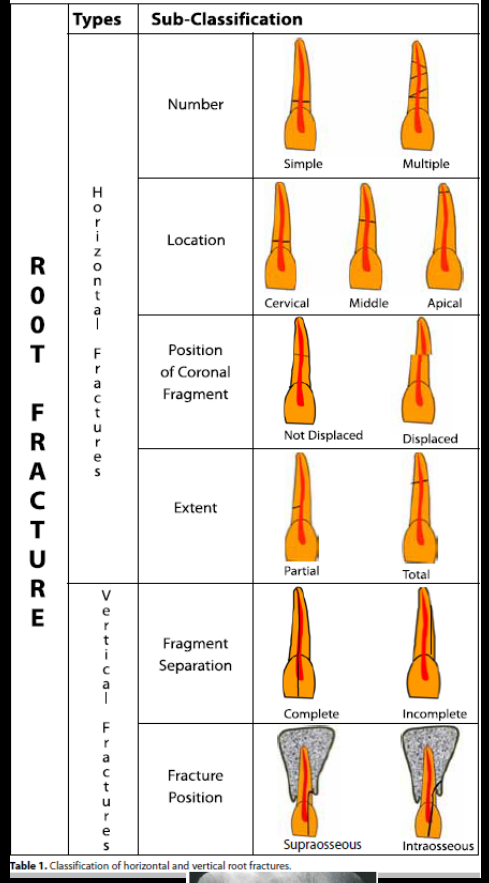


Table 1. Classification of horizontal and vertical root fractures.

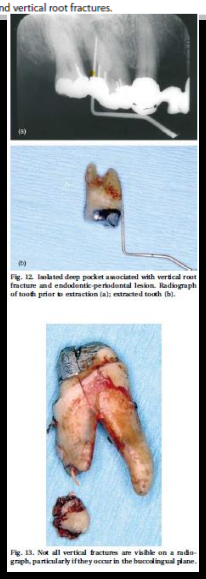


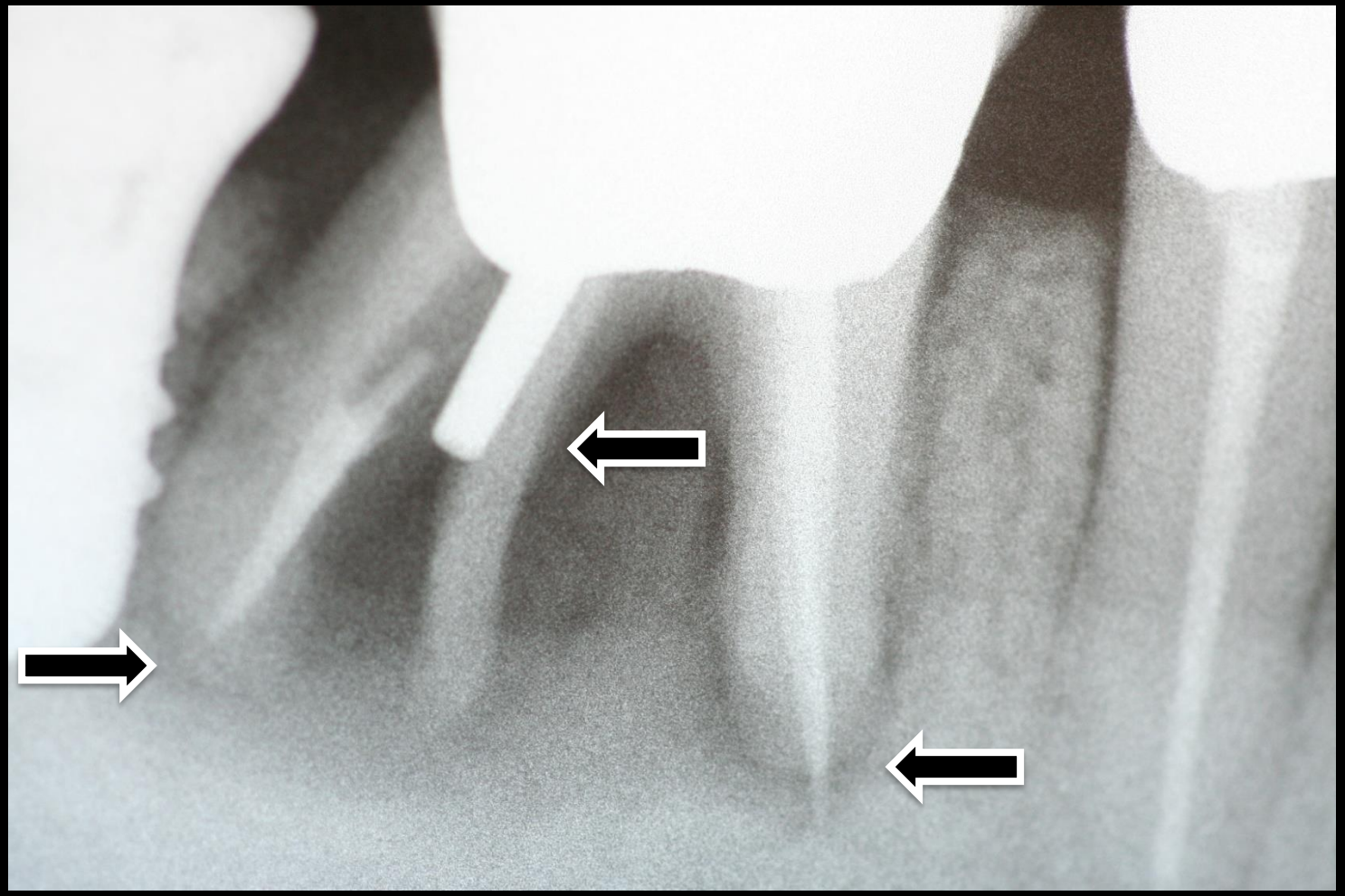
Fig. 12. Isolated deep pocket associated with vertical root fracture and endodontic-periodontal lesion. Radiograph of tooth prior to extraction (a); extracted tooth (b).

Fig. 13. Not all vertical fractures are visible on a radiograph, particularly if they occur in the buccolingual plane.

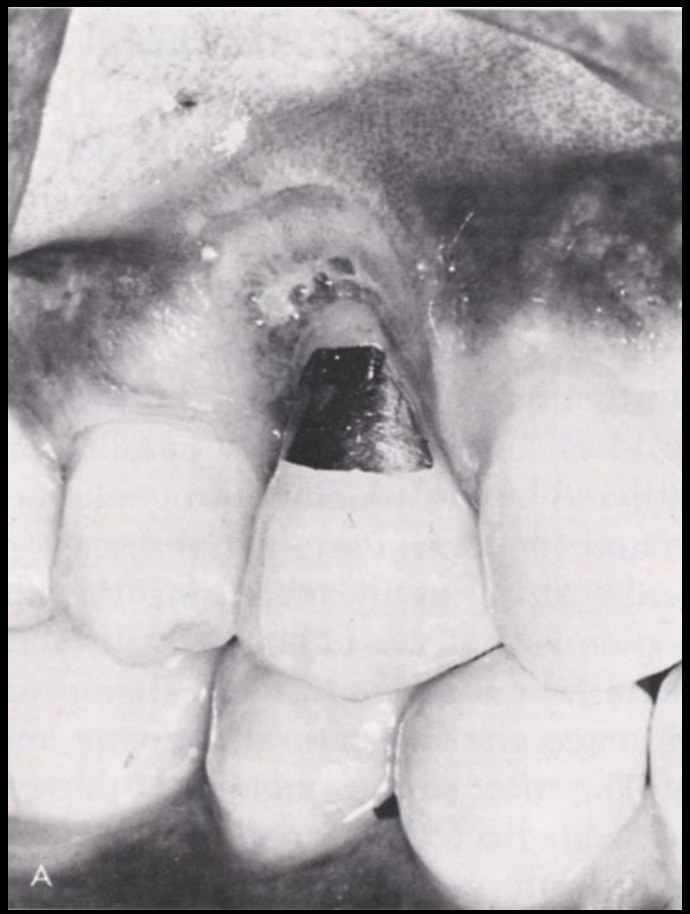
- VRF defined as longitudinal fractures that might begin on the internal canal wall and extent outward to the external root surface per Ercoli et al. 2018. Fractures located w/ cervical 1/3 rd. root act as PLAQUE RETENTIVE b/c more colonization of subgingival plaque and indirectly cause gingivitis & periodontitis

- Fractures w/in midroot & apical region favorable prognosis in a 10-year study (78% & 89%) tooth survival while fractures located w/in cervical 1/3 rd. of root has worse prognosis for tooth retention

ENDODONTIC THERAPY & periodontium



Soft-tissue damage by the improper use of a rubber dam clamp

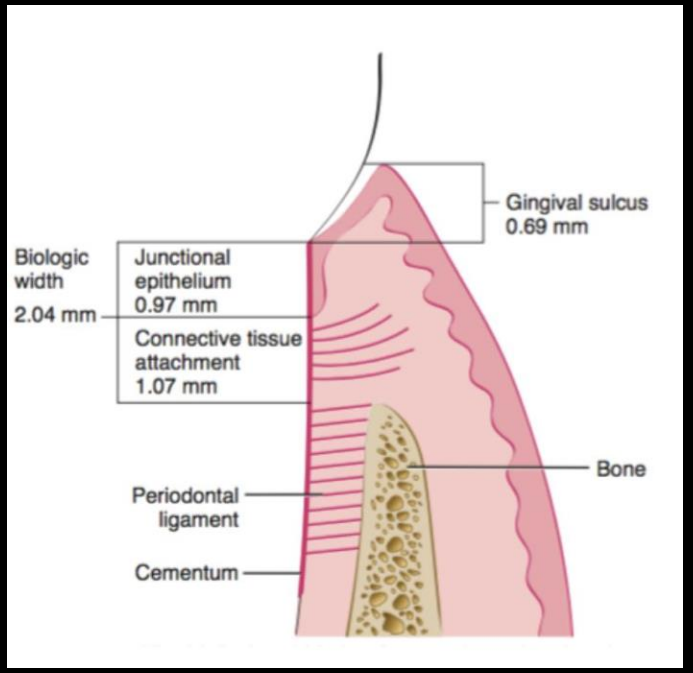


Courtesy, R. Yuodelis

Restorative Factors

BIOLOGICAL WIDTH (BW)

- "Physiological dimension of supracrestal gingival dimension (dentogingival component) composed of junctional epithelium JE (0.97mm) & supracrestal connective tissue attachment SCTA (1.07mm)"
- Per this cadaver study the most constant average dimension was the SCTA and most variable was JE
- Ercoli et al. (World Workshop)- have reported that BW dimensions can only be assessed by histology and other methods such as transgingival probing and parallel profile radiographs can be used to clinically measure dimensions of DG unit but not ideal appropriate.



Gargiulo AW et al. Dimensions and relations of the Dentogingival junction in humans. J Periodontol 1961

Poor crown fit and form, encroachment of gingival attachment (biological width)

-Ideally, explain to the patient that what crown lengthening is in simple words

-Prepare ideal margin per restorative needs, and then refer to periodontist with an ideal provisional so they can prepare new bone level per your margin

Gingival encroachment, poor marginal fit & closed crown embrasures

, M. Maveli

Gingival encroachment, poor marginal fit & closed crown embrasures

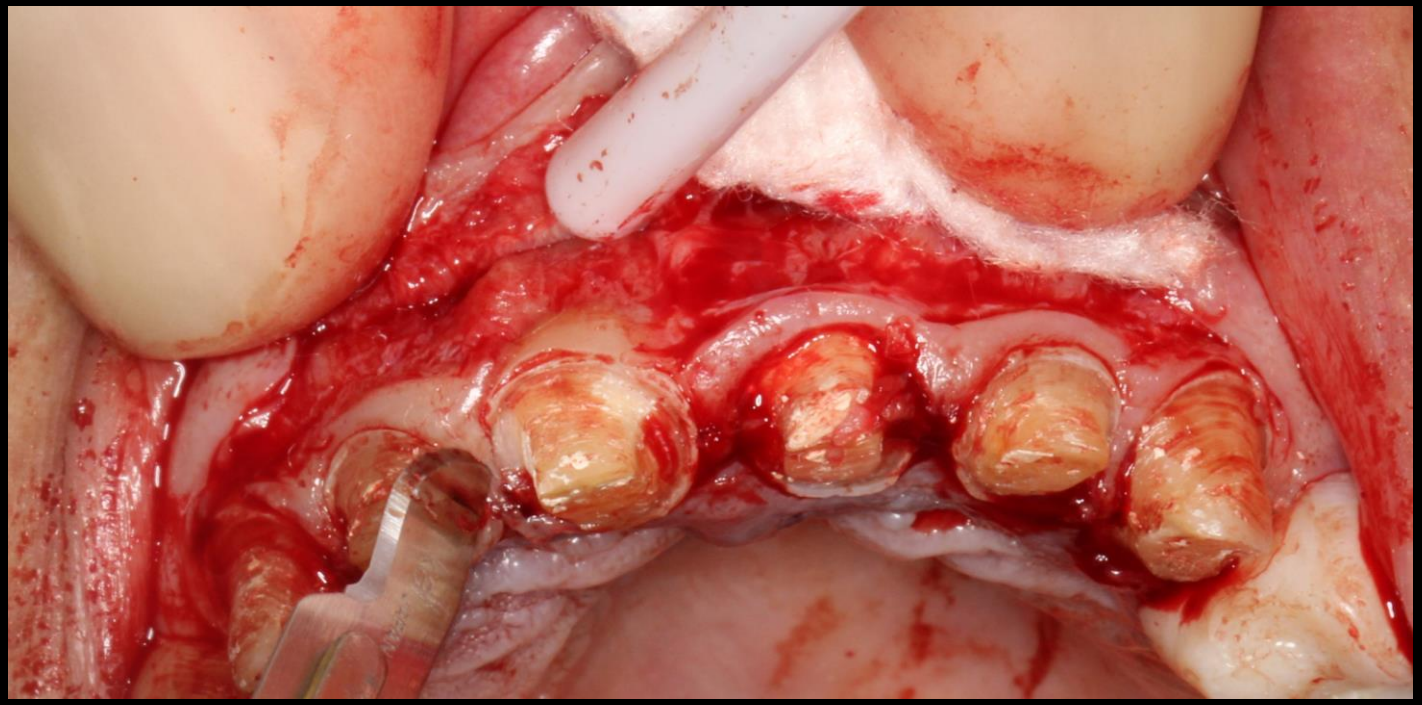
These iatrogenic effects have led to gingival irritation, inflammation & difficulty controlling plaque

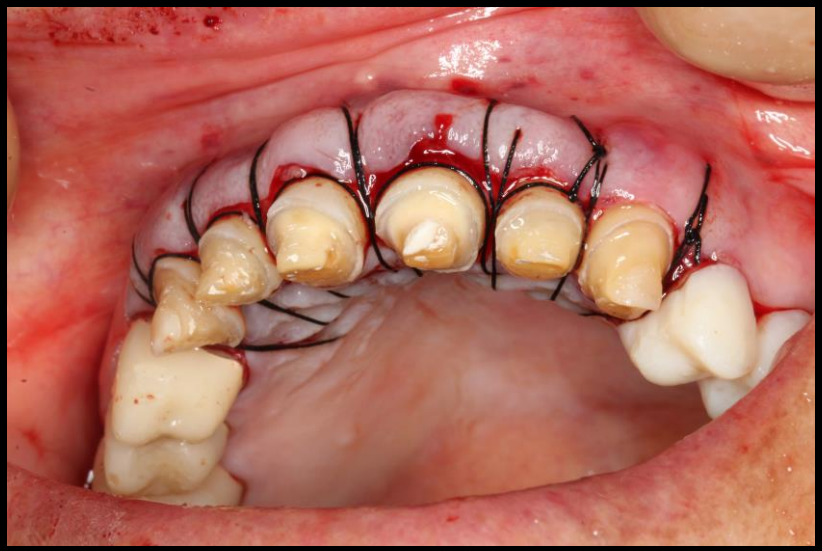
Courtesy, M. Maveli

Esthetic Crown Lengthening

Referral from restorative dentist for short clinical crowns and excessive gingival tissue

Temps removed, short clinical crowns w/ excessive gingival tissue





PO ~ 3 weeks

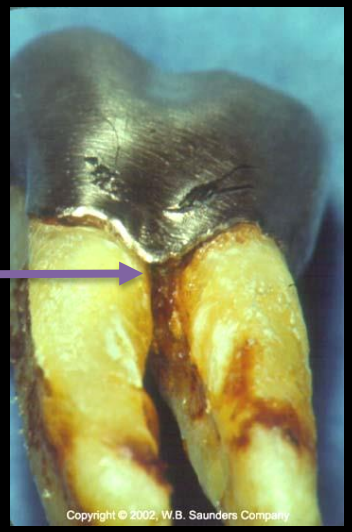
RESTORATIVE FACTORS

Subgingival Margins

- Subgingival margins can cause negative effects on the periodontium if margins violate the supracrestal connective tissue attachment (SCTA)

- Measures such as transgingival probing & parallel profile radiographs per Lanning & Novak et al. are measures clinically used

Extracted mandibular molar--gold margin not adapted into furca & open plaque trap



Subgingival margins

- In Class II restorations, gingival inflammation is significantly > in subgingival vs supragingival margins per literature r
- Tal et al. (1989) performed a long-term dog study to investigated the effect of the violation of the BW by placing amalgam restorations at the level of the alveolar bone crest .
- Concluded prolonged periods of abuse of the gingival attachment results in certain loss of the periodontal attachment apparatus, but BW is partially restored w/ a more apical and reduced SCTA
- Waerhaug et al. examined 108 extracted teeth with subgingival restorations with the aim of scoring presence or absence of subgingival plaque, concluded that rough surfaces have rapid plaque adherence than smooth surfaces & restorations placed below the gingival margin are involved in the etiology of destructive periodontal disease and cause of numerous extractions

Distributions of the various materials used for restorations

Type of restoration	No.	Subgingival with plaque	Subgingival without plaque
Amalgam	76	71	5
Gold	8	6	2
Cement	13	13	
Zinc oxide-eugenol	7	5	2
Acrylic	4	4	
	108	99	9

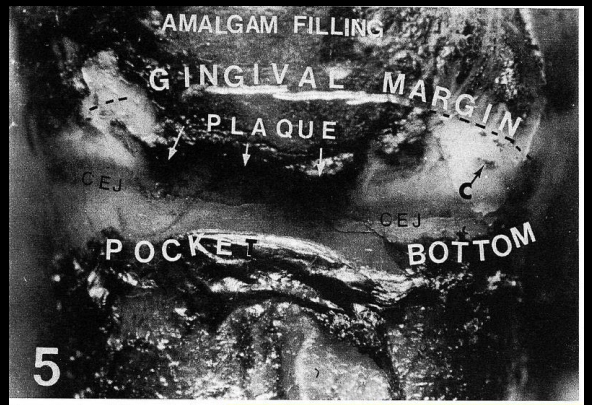


Fig. 5. Amalgam filling made about 2 years before extraction of the tooth. Subgingival part of filling was completely covered with plaque and the plaque had also proliferated in apical direction from filling margin to extent indicated by arrows. Subgingival scaling carried out 5 months before extraction, demonstrating limitation of this kind of treatment when restorations are present.

Subgingival margins

The two different finish line designs used in this trial.

- A study done per Paniz et al. (2016) determined if placement of a single restoration with subgingival margin on a tooth in the maxillary anterior zone would affect periodontal soft tissue parameters and compared deep chamfer preparation vs. feather edge preparations in terms.

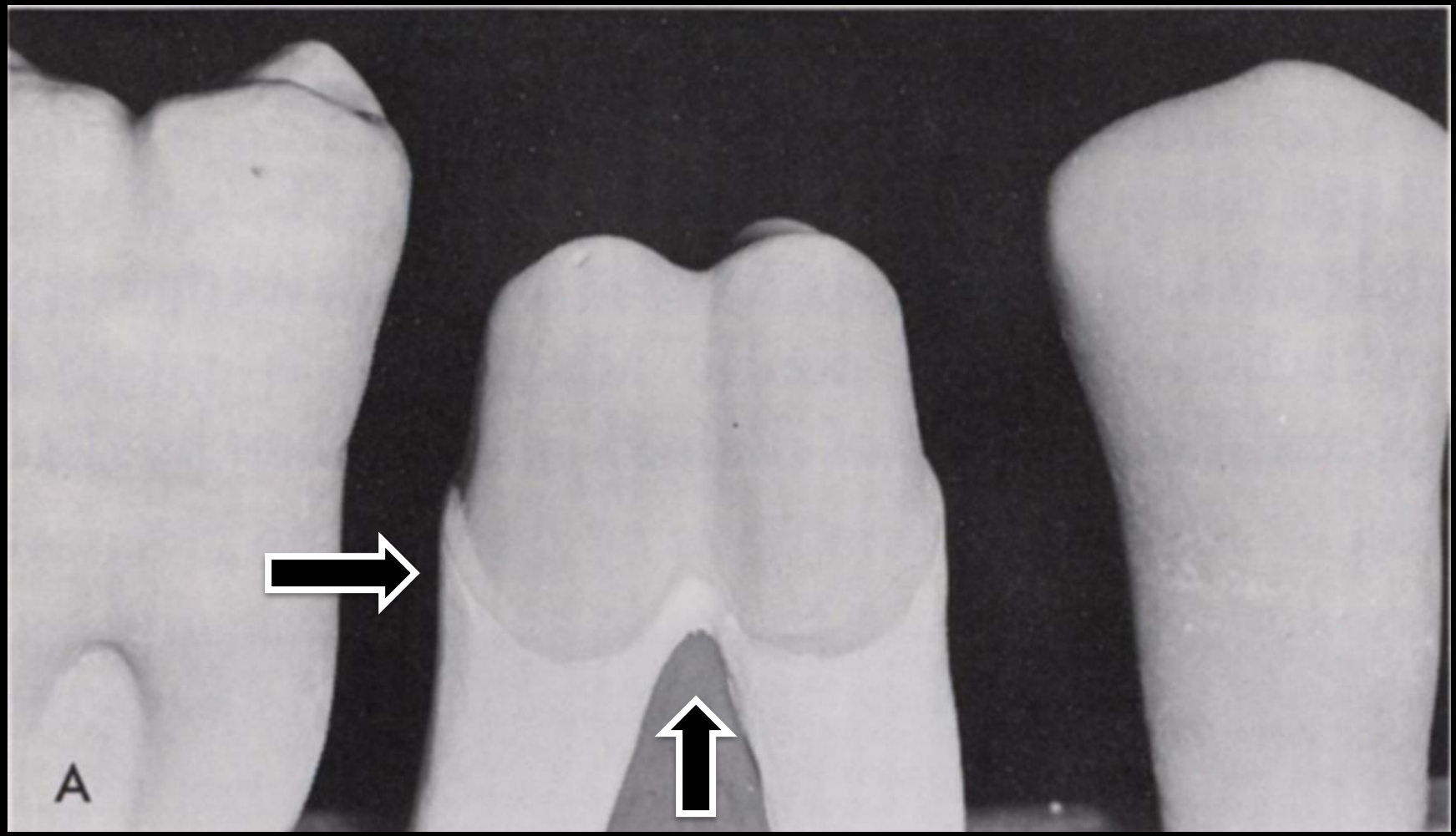
- Statistically significant difference b/w baseline & 12-month fu in terms of BOP with feather edge > bleeding than chamfer

-Concluded that Vertical tooth preparation in maxillary anterior zone might be preferred b/c less REC but improved patient comfort was registered w/ deep chamfer margin design

Chamfer margin design.

Feather-edge margin design.

Tooth preparations from a periodontal perspective



Flute your margins if needed

Incomplete cementation, sub-gingival cement

SEM of open margin: thick cement prevented complete seating of crown

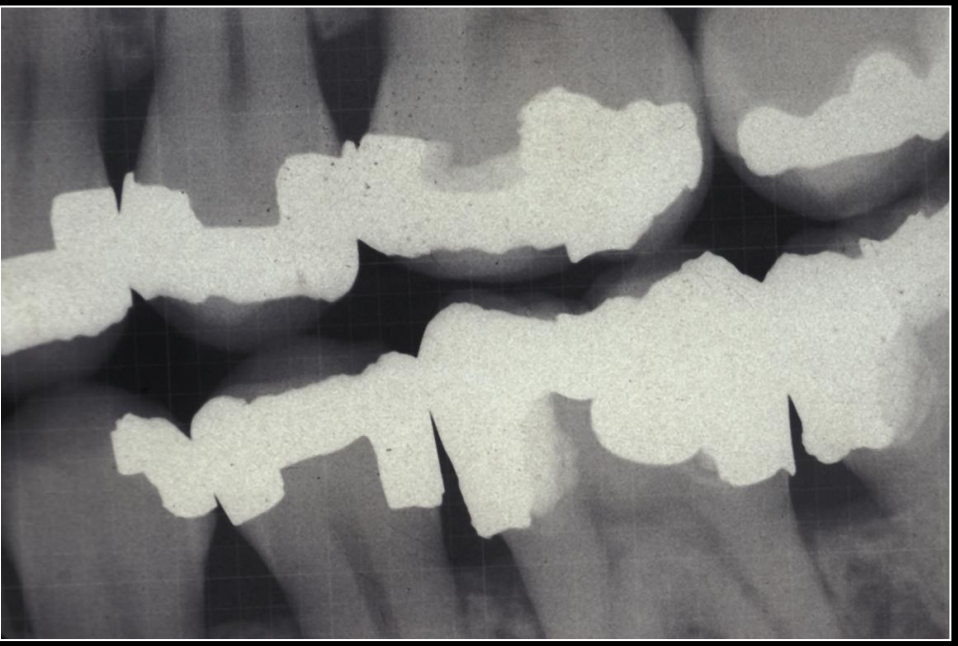
- Incomplete seating of a crown on a natural tooth may result in excess cement, recurrent caries, open margins, tooth sensitivity, periodontal inflammation and foreign body reactions
- Double check your restoration before cementing

Overhanging dental restorations

- Primarily found in Cl II restorations b/c difficult access for cleansibility in patients with good OH.
- Matthews et al (2004) state that > periodontal attachment loss associated w/ overhangs w/ > plaque formation & shift in microbial composition from health to periodontal pathogen
- Overhangs may cause damage by impinging on interdental embrasure & Biologic Width.
- Recommend to use sensitive tactile instrument along w/ radiographs to aid in detection

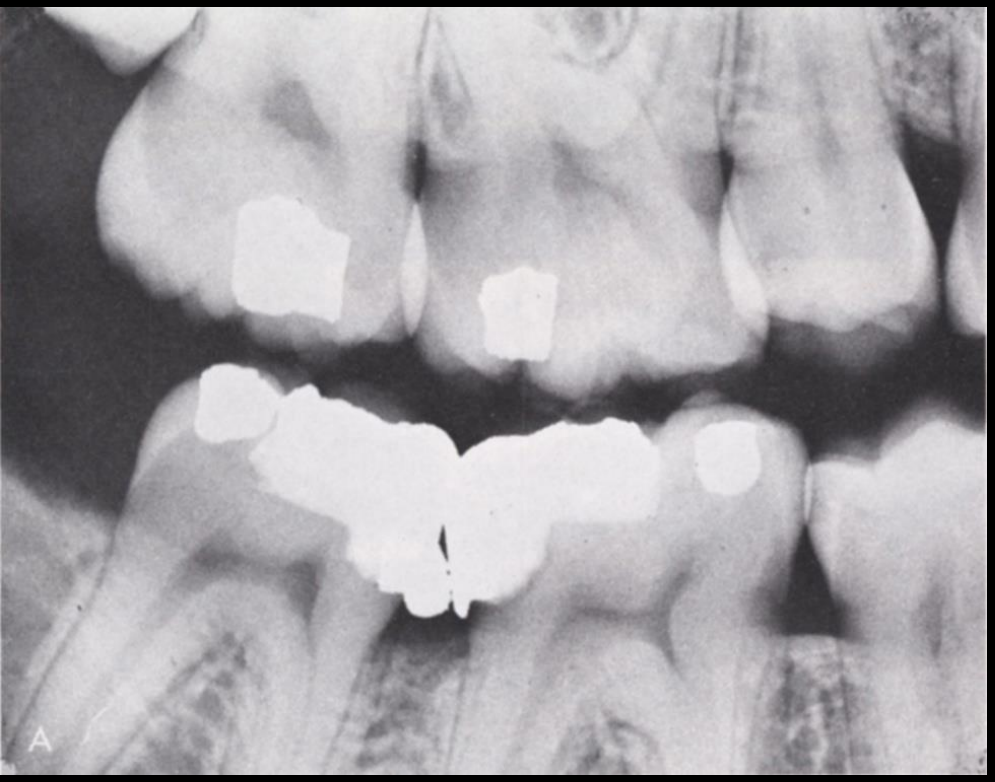
Table 2. Prevalence of overhanging dental restorations (adapted from Brunsvold & Lane, 1990 (17))

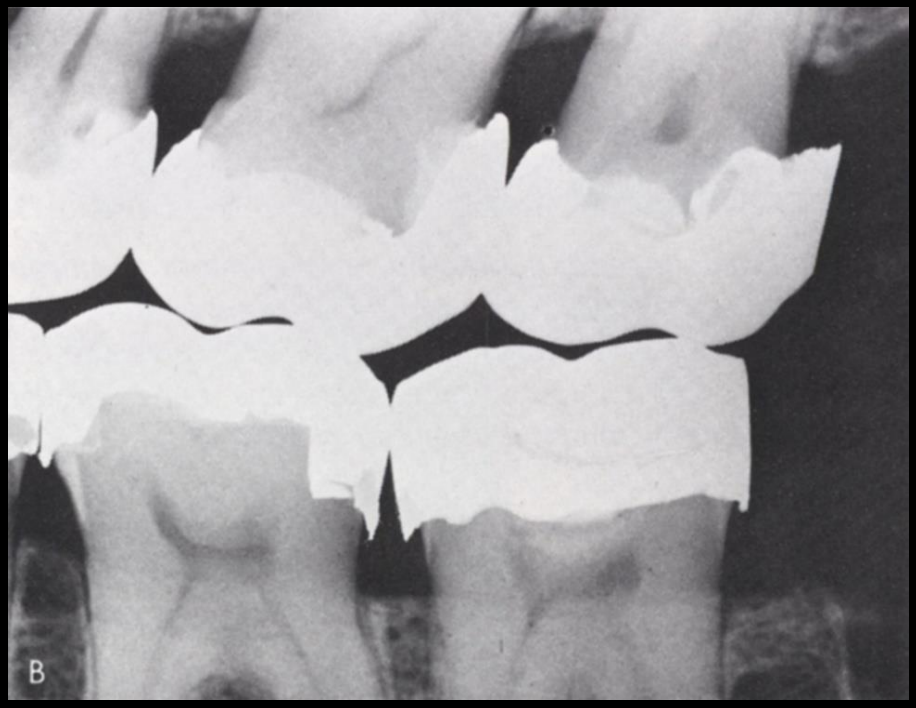
Reference	Diagnostic method for detection	% restored surfaces with overhangs (n = number of subjects)
Gilmore & Sheiham, 1971 (37)	Bitewing radiographs	25% (n = 1976)
Burch et al., 1976 (19)	Bitewing radiographs	30% (n = 825)
Hakkrainen & Ainamo, 1980 (43)	Orthopantograms	50% (n = 85)
Than et al., 1982 (114)	Calculus probe	60% (n = 240)
Lervik & Riordan, 1984 (68)	Bitewing radiographs, microscope	25% (n = 175)
Keszthelyi & Szabo, 1984 (60)	Bitewing radiographs, microscope	86% (n = 176)
Coxhead, 1985 (23)	Bitewing radiographs, mirror, probe	76% (n = 50)
Claman et al., 1986 (22)	Bitewing radiographs	27% (n = 826)
Jansson et al., 1994 (55)	Bitewing radiographs	18% (n = 162)



Courtesy of Dr Silston

Faulty Direct & Indirect Restorations



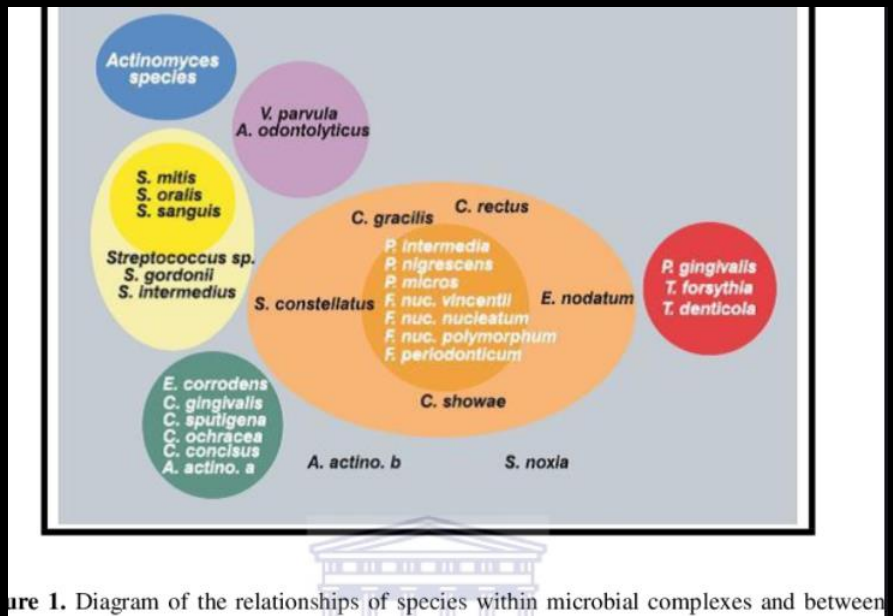


OVERHANG

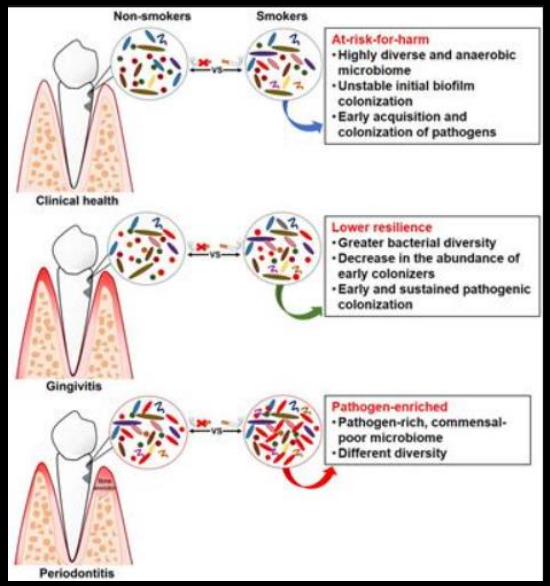
- Lang et al. (1983) – placement of subgingival restorations w/ overhanging restoration resulted in changes in subgingival microflora

- Overhang crowns lead to > sub-G pathogenic bacteria (anaerobes & black pigmented Bacteroides species) and flora resembled chronic periodontitis. After placement of perfect margin, the species changed to resemble gingival health or initial gingivitis stage

-Concluded that the subgingival microflora after placement of restorations with overhang margins showed a possible mechanism for changes in flora of pathogens leading to periodontal disease due to iatrogenic factors



ure 1. Diagram of the relationships of species within microbial complexes and between



Case

c/c “ I want to save my second molar because I never have had an extraction”





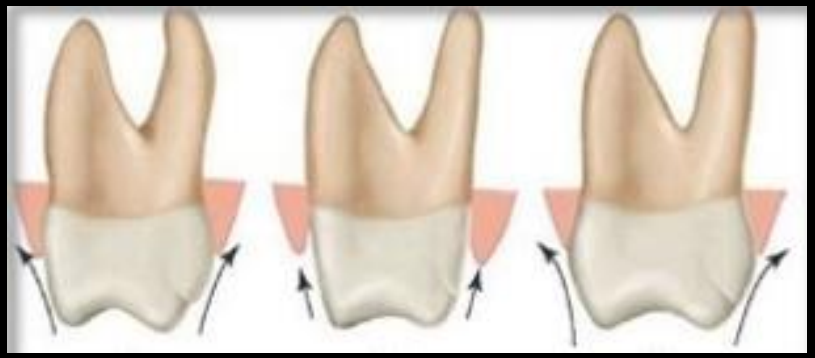
- #31 had deep pockets w/ VRF but upon laying the flap overhang >3mm noted on #30
- Plaque retentive factor must be eliminated, and margins were fluted

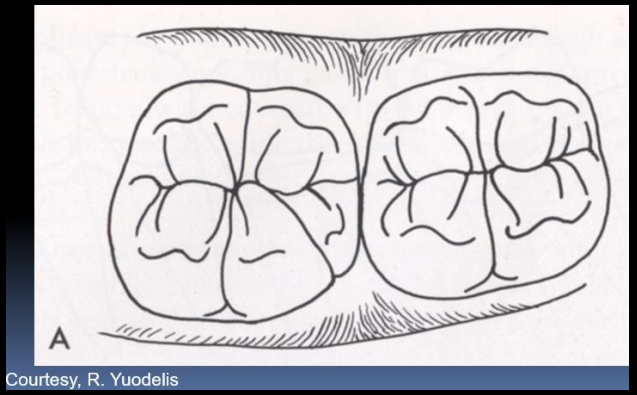
Crown Contours

- Indirect restorations that are over/under contoured can cause problems on the facial or lingual surfaces

Under contoured restorations-cause trauma & irritation to the attachment apparatus

Over contoured restorations-deflect food from the gingiva causing poor gingival stimulation leading to chronic gingival inflammation, erythematous & increased retention of plaque



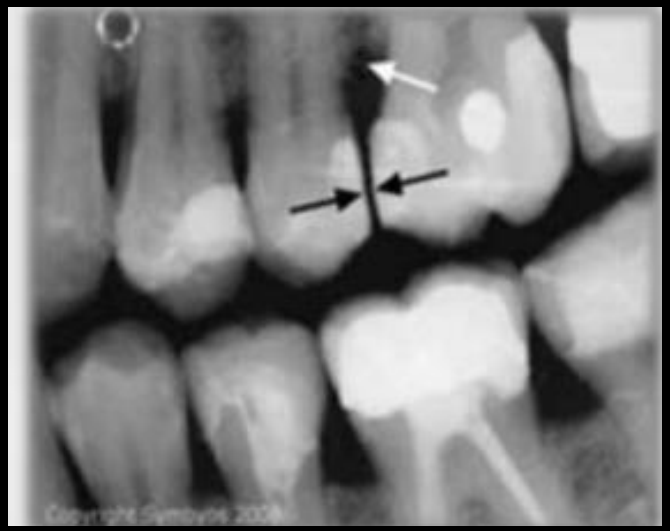


OPEN CONTACT

- Per Ercoli et al. open contacts allow food impaction in between teeth the greater occurrence of food impaction @ sites w/ open contacts associated w/ > PD in those areas

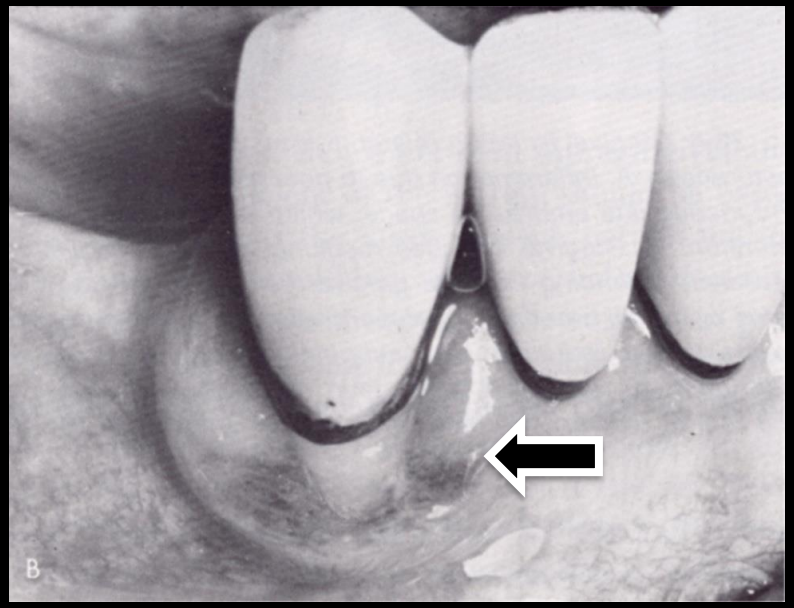
- Jernberg et al. (1983)- Greater prevalence of food impaction & occlusal interferences at the open contact site were statistically significant & stated that maxillary posterior teeth primary concern

- If you have an open contact, don't cement the final restoration! Plaque trap



Traumatic restorative procedures—faulty preparation and impression technique

The connective tissue attachment has been violated, there is no Keratinized tissue. All mucosa!



Resultant gingival reaction to encroached margin placement

Courtesy, R. Yuodelis

Summary

Individual Risk Factors		Local Risk Factors
Modifiable Risk Factors	**Nonmodifiable Risk Factors**	
Smoking	Age	Root proximity
Diabetes	Genetics	Tooth malposition
Obesity	Gender	Enamel pearls and cementoenamel projections
Others such as stress, osteoporosis, alcohol consumption, nutritional deficiencies	Ethnicity	Root abnormalities such as palatoradicular grooves, cemental tears
		Others such as subgingival restorations, open contacts

Implant-Restorative Therapy & Iatrogenic effects

- Periimplantitis is a major cause of implant failure, with cement becoming an irritant if left in the gingival sulcus

- One of the etiological factors in peri-implantitis is cement and screw retained restorations are preferred

- If cement is used, some experts recommend using a temporary cement and not permanent for also retrievability of abutment in the event of crown fracture

Courtesy, Wadhwani and Pineros

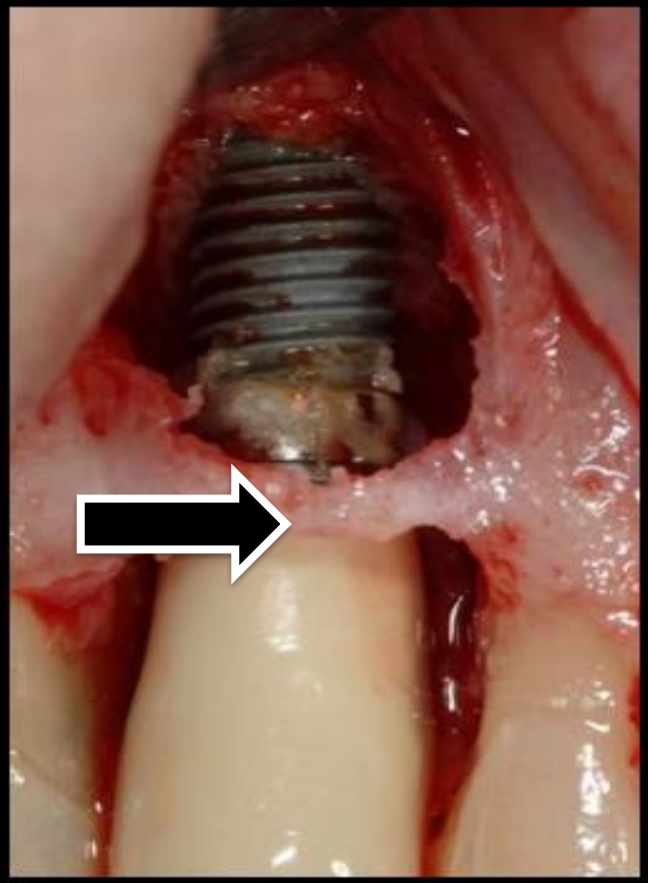
Implant-crown seated, after a few months' peri mucositis occurs

Courtesy, Wadhwani and Pineros

Surgical flap laid to expose area

Courtesy, Wadhwani and Pineros

Flap raised



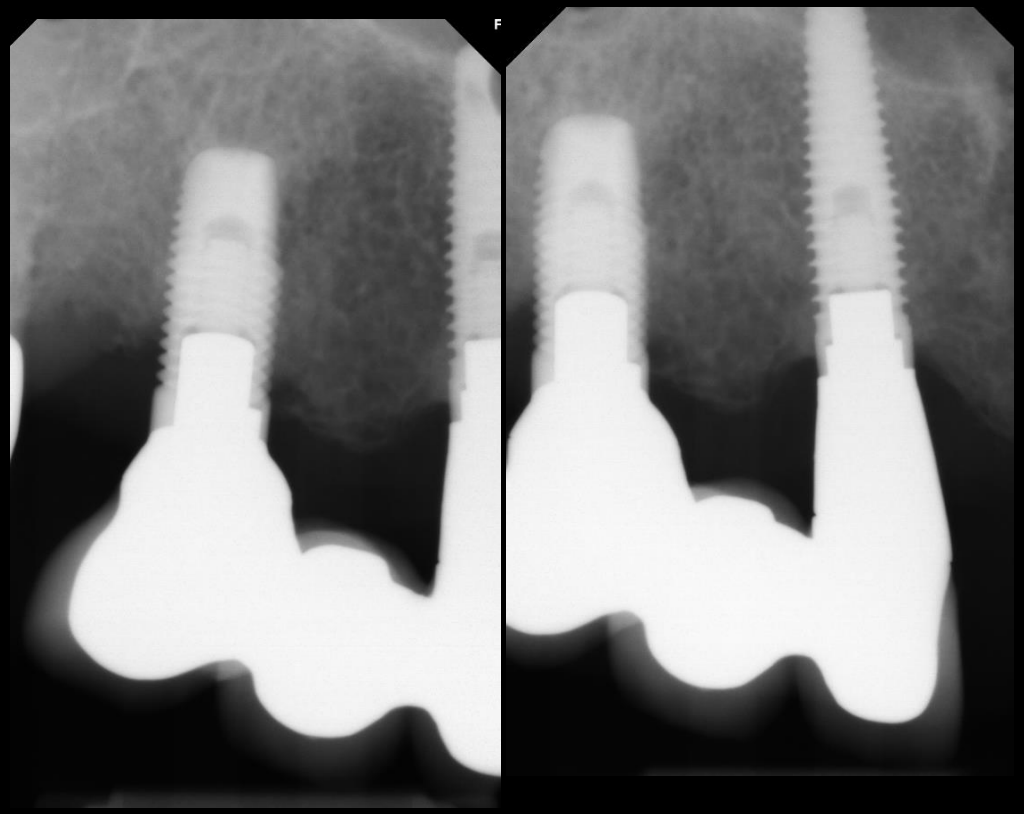
Excess Cement

Courtesy, Wadhwani & Pineros

-Implant failures can occur due to systemic issues along with restorative mistakes
-Not only is crestal bone lost but in anterior cases major soft tissue grafting will be also needed to restore lost soft tissue height

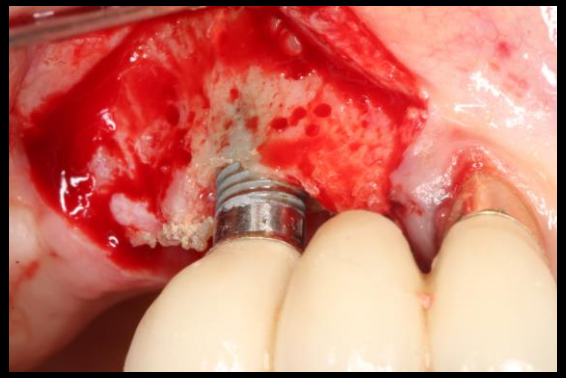
Case

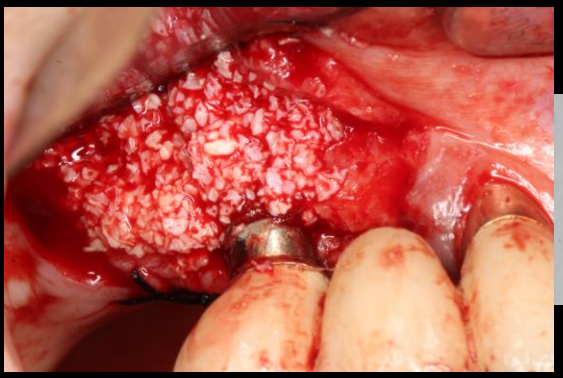
c/c” I don’t want to lose my implant FPD, I can't afford a new bridge and new implants”

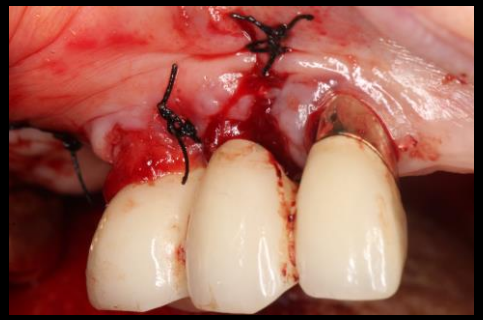


- Periimaplantis noted, and threads exposed with significant distal bone loss #6

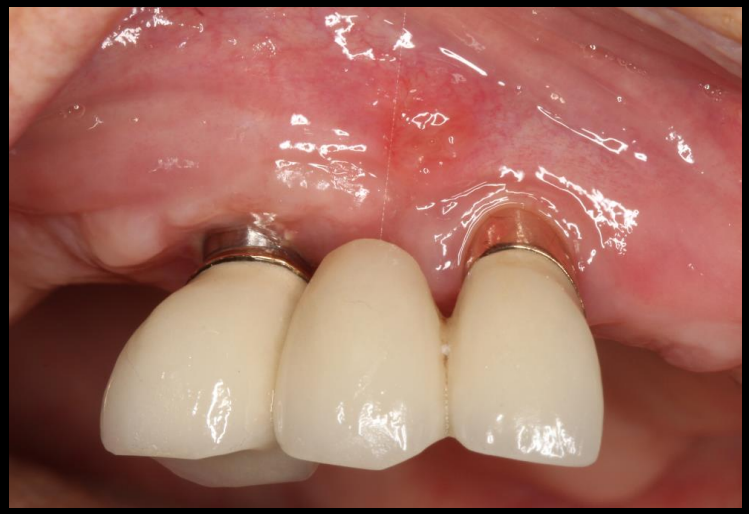
Surgery







Follow up @ 2 weeks, 1 month



Restorative Factors

- Relationship between restorative & periodontal therapy is critical, if the foundation is ideal of the periodontium, then the restorative therapy will be successful
- Both GP and periodontist need to work side by side to get the best patient outcome
- If there is any doubt in a treatment plan good rapport will provide optimal results
- “Teamwork makes the dream work”

Periodontal Maintenance

- Once a patient has had any type of periodontal treatment, they must be placed on a stringent periodontal maintenance plan
- Periodontal maintenance plan does not mean supragingival prophy ONLY!
- Patients with severe periodontal issues should be seen on 3–4-month interval basis

Inflammation/trauma must be eliminated prior to restorative dentistry—a basic principle

1. To predictably coordinate gingival and crown margins (esthetics, hygiene) long-term

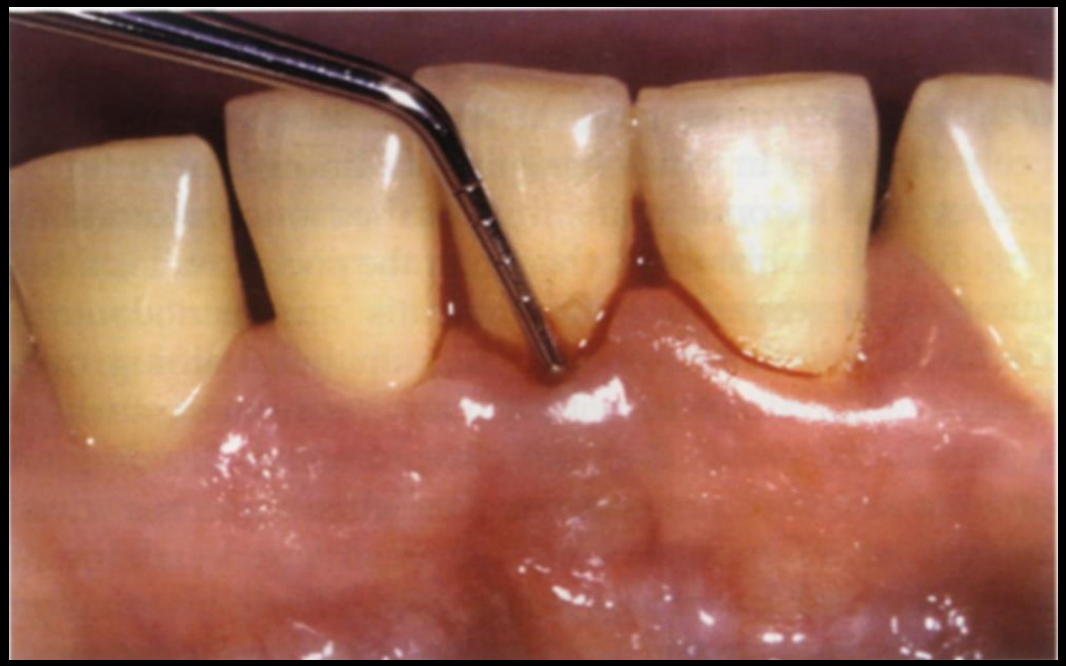
2. To achieve optimal soft-tissue and porcelain color

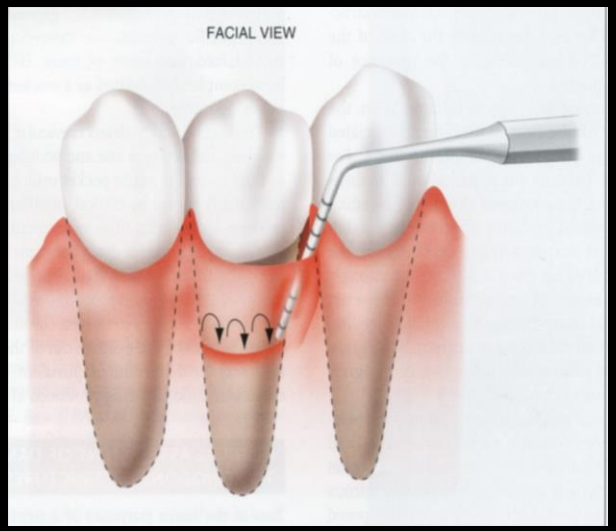
3. To facilitate procedures (preparations, impressions, and cementation) by the restorative dentist

How can we recognize & measure inflammation trauma?

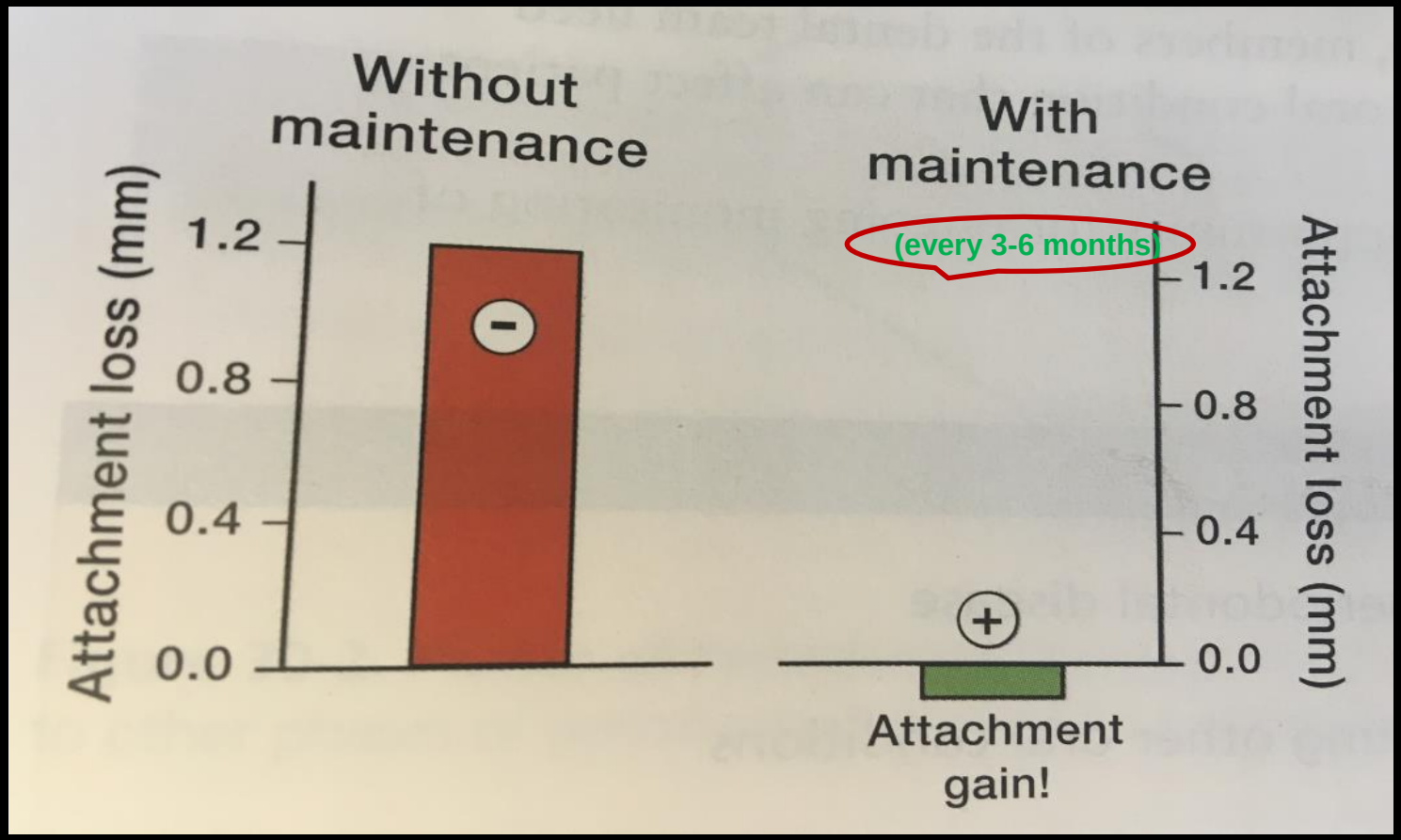
A. Complete examination provides accurate diagnostic information (doctor & dental hygienist gather data)

B. The diagnostic information is used to formulate a sequenced treatment plan (doctor formulates plan)





The importance of periodontal maintenance



The efficacy of a periodontal maintenance care program to prevent the recurrence of disease in patients treated for advanced periodontitis.
(Axelsson P, Lindhe J. 1981)

- Maintenance entails the necessary steps to control the periodontal disease & to keep the periodontium stable
- Retain teeth or implants in functionality and comfort
- Prevent the recurrence of disease, and plaque buildup

“Regardless of any surgical treatment the patient needs to be seen on regular maintenance treatment.”

Goals of Maintenance Therapy

- Reduction of the recurrence and progression of periodontal disease
- Decrease the incidence of tooth loss
- Increasing the probability of detecting and treating other oral conditions

When to Refer?

- Patient must be informed of the periodontal situation, and they must make a choice
- Without informing the patient of their periodontal condition you are at a risk of negligence
- Proper documentation should be done, and patient should be given pros and cons on why the referral is needed
- If a patient has deep pockets & ends up losing their teeth and provider did not do their due diligence possible litigation!!

When to Refer?

Signs of disease recurrence per Chace et al. include:

- Recurrence of BOP
- Increased probing depth
- Radiographic bone loss
- Progressive mobility
- Patient complaining of no improvement after all non-surgical therapy is completed

How do referrals protect us?

- In recent years, an increase in the number of malpractice claims brought against dentists
- This trend has had a profound impact on several aspects of dentistry
- Some of the most common lawsuits are related to extraction of the wrong tooth, failure to diagnose a problem such as perio disease, and lack of proper informed consent

Case #3: Dental Implants
In the implant loss subset, two to 10 implants were lost, and treatment planning was alleged to be deficient to non-existent. The patient with the post-operative infection succumbed to the infection. In 24 of the negligence claims involving dental implant surgery, the defendants were general dentists, and one was a periodontist.

Case #5: Periodontal Disease
There were 19 cases of failure to diagnose or treat periodontal disease in a timely fashion. All defendants were **general dentists**. In most of these cases, X-rays were taken routinely, and periodontal probings were rarely or never recorded.

Should I Save or Extract

- **Tarnow et al**. presented factors when to extract or save teeth

Extract

- Tooth (w/ existing crown) will need a new RCT, crown lengthening, post &new crown

-Lack of tooth structure above the crest i.e., lack of adequate “ferrule”

-High chance of decay and poor oral hygiene in the mouth

-Periodontal surgery will cause high esthetic issues with significant loss of papilla and mobility

-Grade III or greater mobility and furcation involvement

-Crown lengthening referral will lead to poor crown/root ratio, more bone loss, more mobility. IS IT WORTH SAVING??

Save

- Arch is intact
- Functional restorations
- Sufficient tooth structure above the alveolar crest
- Low caries rate
- Little to low periodontal disease
- Tooth is NOT in the esthetic zone
- Patient is emotional about saving tooth at all costs

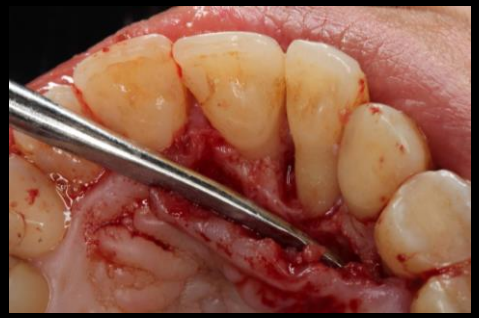
Clinical Case

c/c “My daughter’s front tooth is loose, and we don’t want her to lose it”

Surgery

- In anterior cases, pt. needs to understand possible post-operative results such as :

- Papilla loss
- Black triangles
- Loss of attachment
- Increased mobility (recommend nightguard & splinting)
- Increased recession





Site Preservation

What is Geistlich Bio-Oss®?

- Geistlich Bio-Oss® is a natural bone mineral for bone grafting
- Geistlich Bio-Oss® is made from the mineral part of Australian and New Zealand cattle bone
- The highly purified osteoconductive mineral structure is produced from natural bone in a multi-stage purification process, adhering to the strictest safety regulations.
- Because of its natural origin, Geistlich Bio-Oss® is chemically as well as structurally comparable to the mineralised human bone.

- Geistlich Bio-Oss Pen®

user-friendly applicator containing Geistlich Bio-Oss®

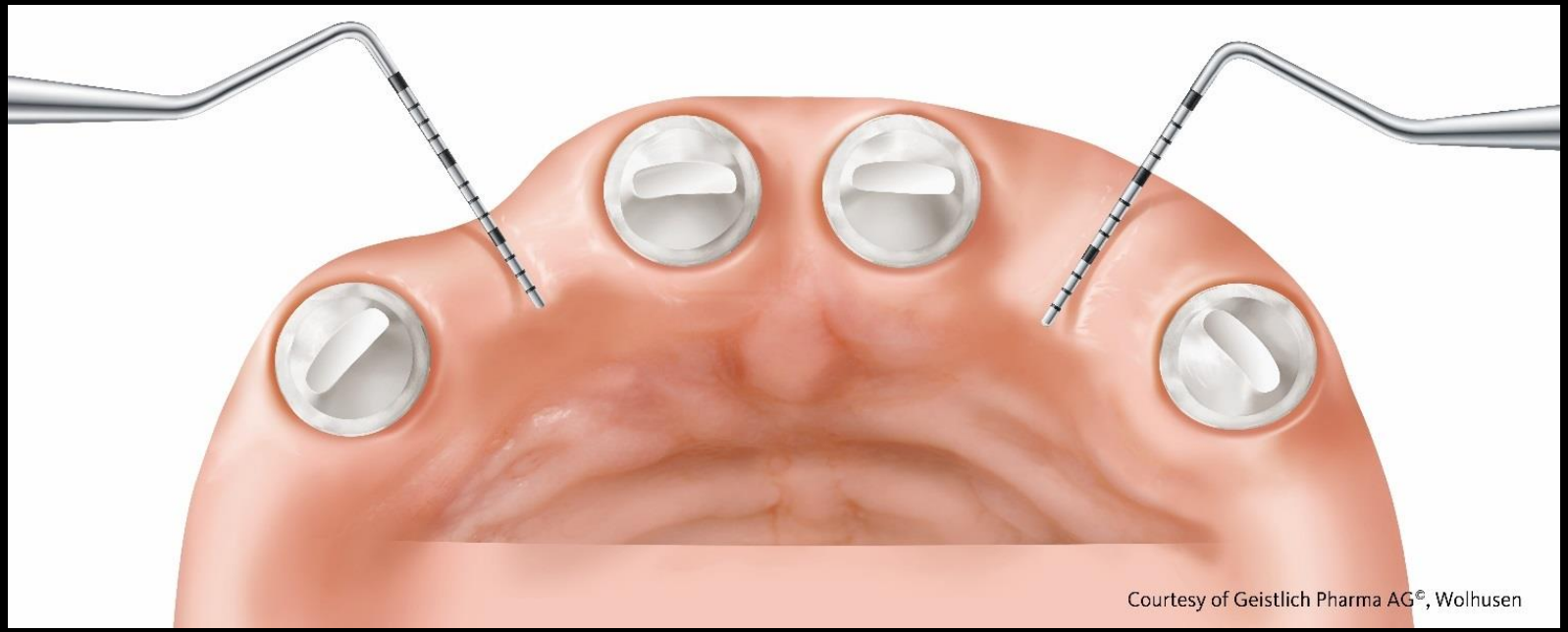
of the granules into the defect area and provides

ies

- Reduces procedure time due to pre-filled Geistlich Bio-Oss granules
- Easy moistening with either saline solution or patient blood
- No waste of granules due to smart design
- Ergonomic design with curved applicator tip
- Allows optimal access to posterior areas-great in sinus cases


LEADING REGENERATION
Geistlich
Biomaterials
Geistlich
Bio-Oss Pen®
Step-by-step handling video

Schematic Illustration of the alveolar ridge after tooth extraction



- The left side of the image shows an atrophic ridge which is eventually the case when no ridge preservation is performed
- The right side shows a preserved alveolar ridge after ridge preservation is performed with Geistlich Bio-Oss® Collagen and Geistlich Bio-Gide® or Geistlich Mucograft® Seal
- Study done by Iasella et al showed that the usage of bone graft and collagen membrane had a increase in horizonal and some vertical gain

Ridge Preservation after tooth extraction

using

Geistlich Bio-Oss® Collagen
and Geistlich Mucograft® Seal

PD PhD Ronald Jung
Department of Fixed and Removable Prosthodontics
Zürich, Switzerland

sponsored by Geistlich Biomaterials

Collagen Membrane

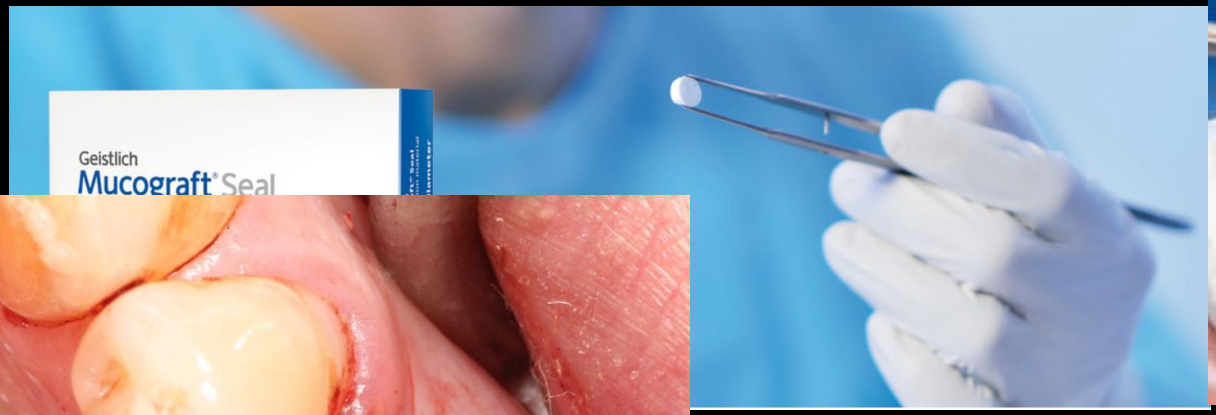
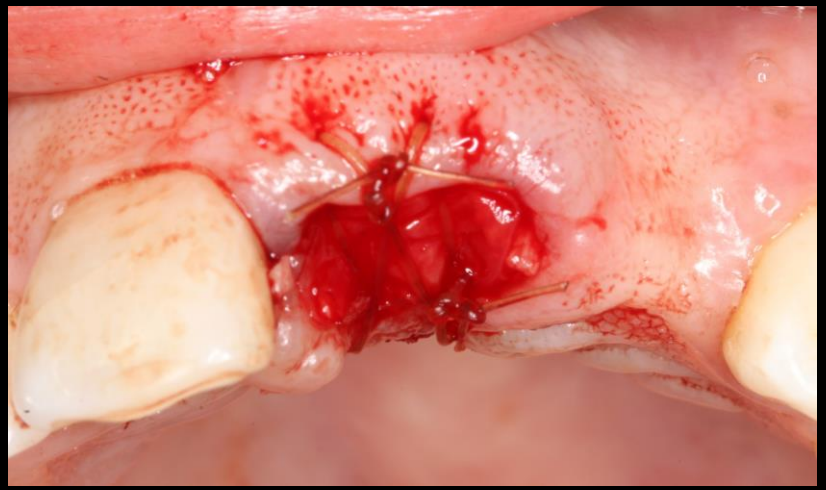


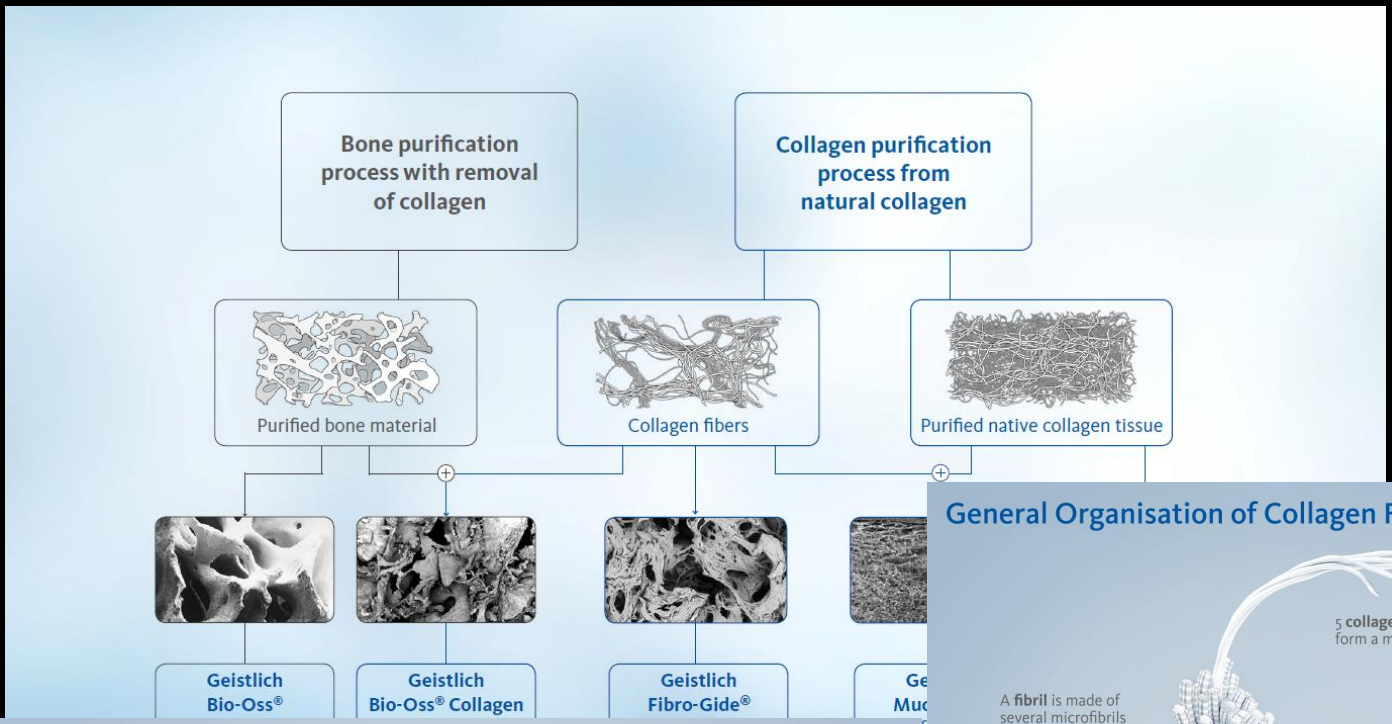
Fig 8 suture

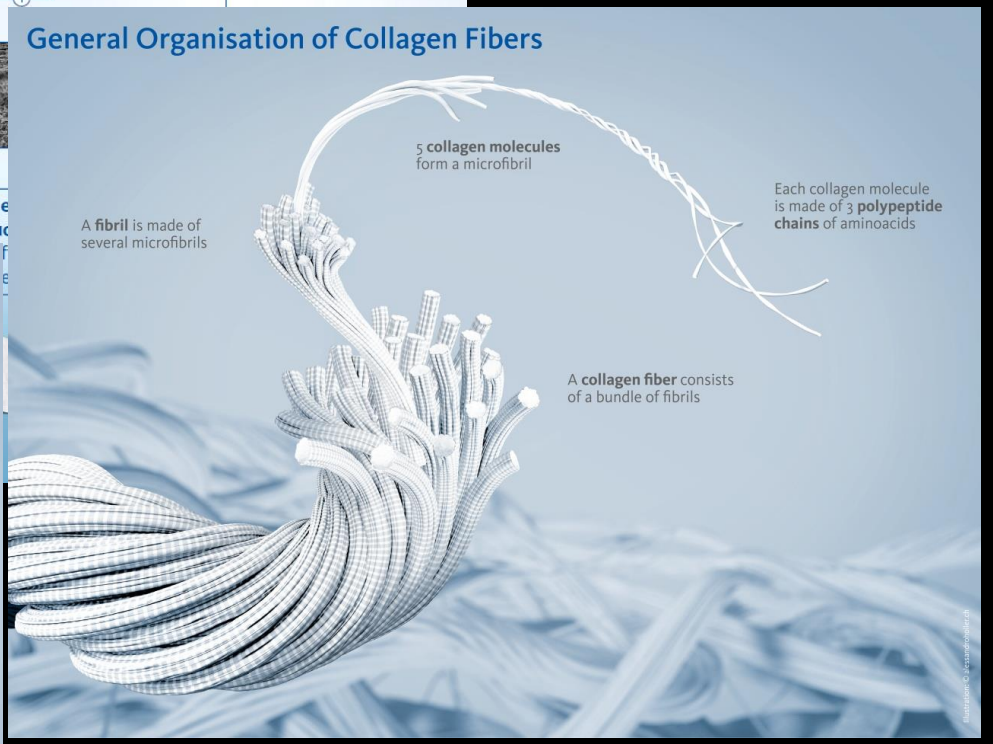


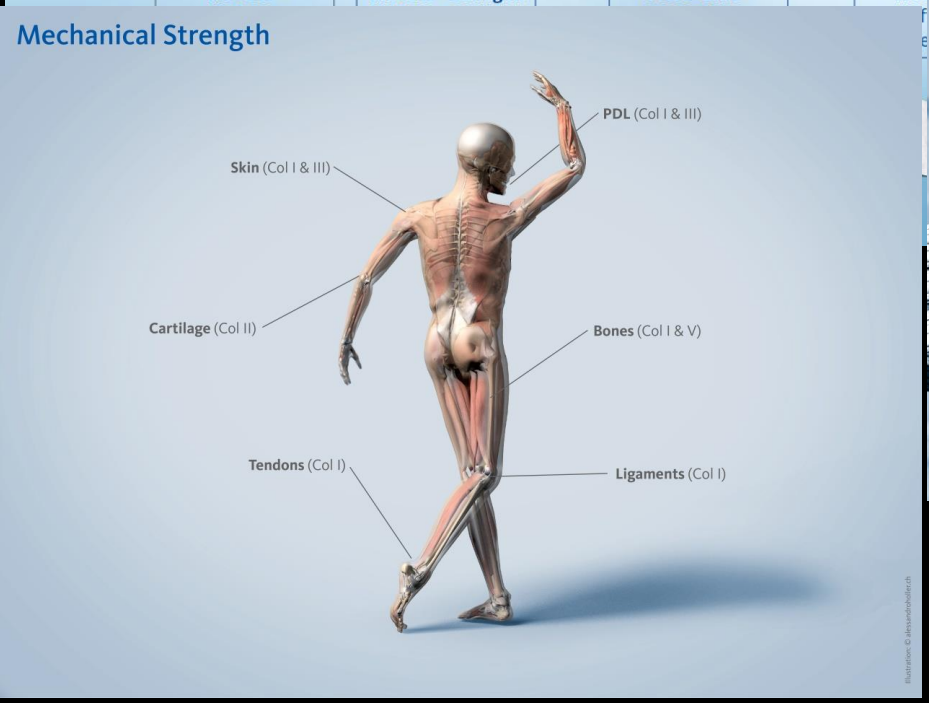
Geistlich Mucograft® Seal?

- Geistlich Mucograft® Seal is Geistlich Mucograft® in a convenient round shape specially designed as extraction socket seal
- Porcine collagen matrix for soft-tissue regeneration
- Natural collagen specially processed for soft-tissue regeneration with no further artificially cross-linked collagen
- Always to be used in combination with a bone substitute, e.g., Geistlich Bio-Oss® Collagen
- Geistlich Mucograft® Seal is an alternative to autogenous graft:
  - Soft tissue punch from the palate

Mucograft Seal


Bone purification process with removal of collagen
Collagen purification process from natural collagen
Purified bone material
Collagen fibers
Purified native collagen tissue
Geistlich Bio-Oss®
Geistlich Bio-Oss® Collagen
Geistlich Fibro-Gide®


General Organisation of Collagen Fibers
5 collagen molecules form a microfibril
Each collagen molecule is made of 3 polypeptide chains of aminoacids
A fibril is made of several microfibrils
A collagen fiber consists of a bundle of fibrils


Mechanical Strength
PDL (Col I & III)
Skin (Col I & III)
Cartilage (Col II)
Bones (Col I & V)
Tendons (Col I)
Ligaments (Col I)

Indications

Geistlich Bio-Oss® s intended for the following uses:

- Augmentation or reconstructive treatment of the alveolar ridge
- Filling of infrabony periodontal defects
- Filling of defects after root resection, apicoectomy, and cystectomy
- Filling of extraction sockets to enhance preservation of the alveolar ridge
- Elevation of the maxillary sinus floor
- Filling of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR)
- Filling of peri-implant defects in conjunction with products intended for Guided Bone Regeneration (GBR)

Available sizes *

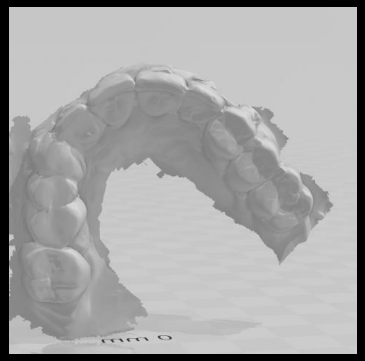
- **Small Geistlich Bio-Oss® granules (0.25 - 1 mm)**
  - 0.25 g ≈ 0.5 cm^3
  - 0.5 g ≈ 1 cm^3

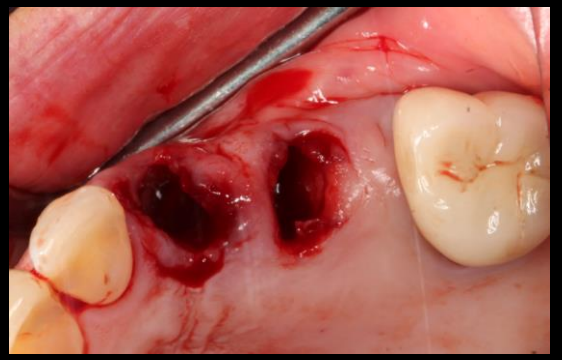
- **Large Geistlich Bio-Oss® granules (1 - 2 mm)**
  - 0.5 g ≈ 1.5 cm^3

Implant Therapy

Site Preservation

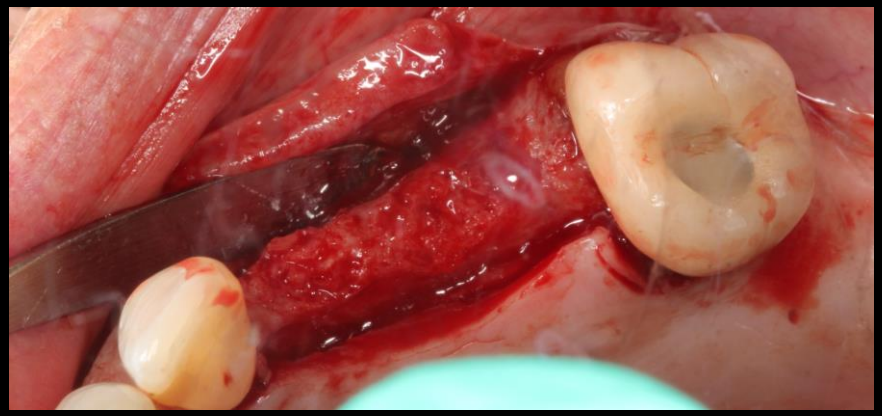
Recurrent decay on existing PFM's, short clinical crowns, lack of ferrule, preps angulation?

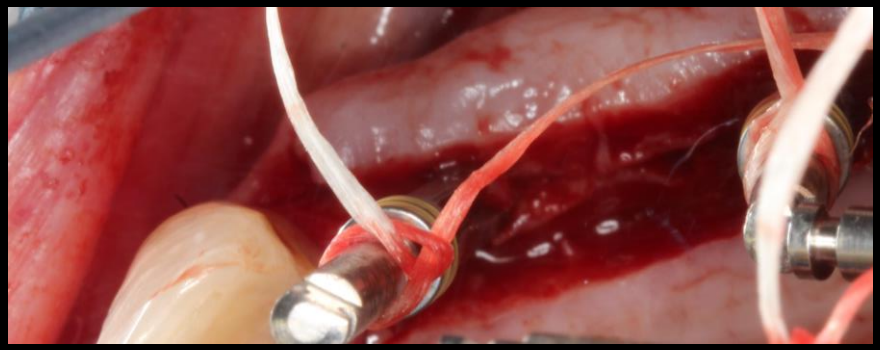


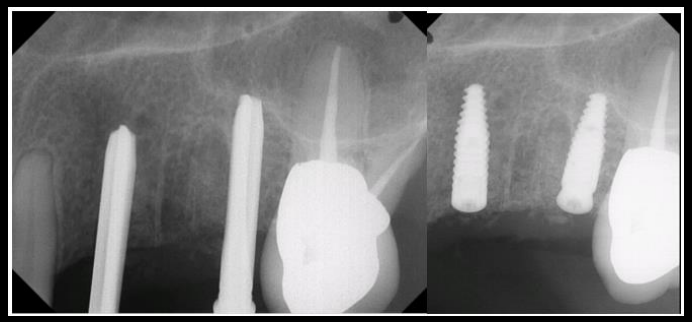


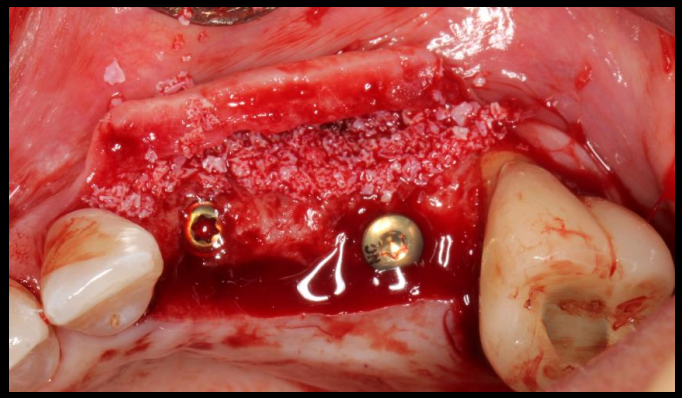
Implant therapy & GBR

- In In 4 months, CBCT was taken, and pt. was scheduled for implant placement
- Adequate ridge noted for implant placement for #11-13, surgical guide created for optimal placement









CONCLUSION

- Thorough evaluation of local factors should be done to determine the etiology of the disease process prior to surgical therapy.
- Understanding of complex and unique anatomy of teeth should be a perquisite for successful periodontal therapy
- Plaque retentive features should be removed or recontoured
- Indirect and direct restorations should always be placed supragingival, subgingival margins should be avoided if possible so violation of the SCTA does not occur.
- Properly designed restorations are integral in the health of periodontal tissues & overhangs/ open contacts should be addressed during phase
- Open communication is key between restorative dentist and specialist

Feel free to email me at hdsingh1891@gmail.com for any questions, or if you need any periodontal services