

Morphology of periodontal defects, indications of periodontal surgery

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Periodontium

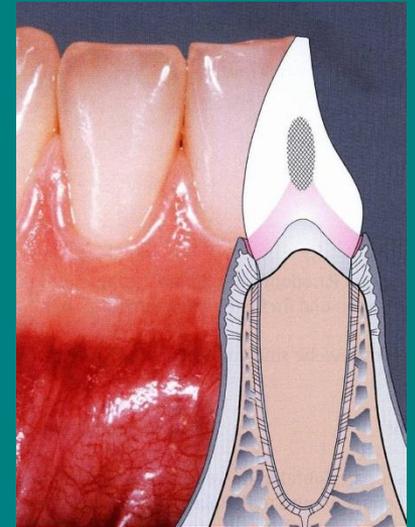
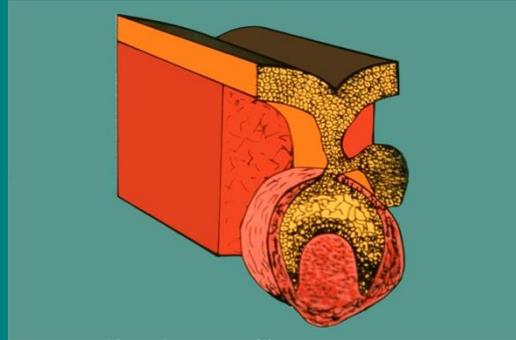
Gingiva

+

Cementum

PDL (periodontal ligament)

Alveolar bone

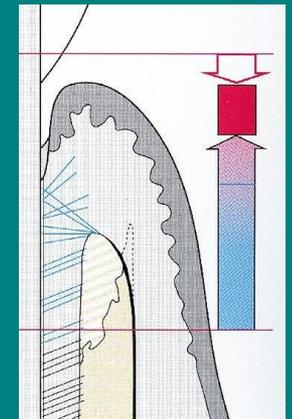


they develop together during ontogenesis

(Ten Cate, 1975)

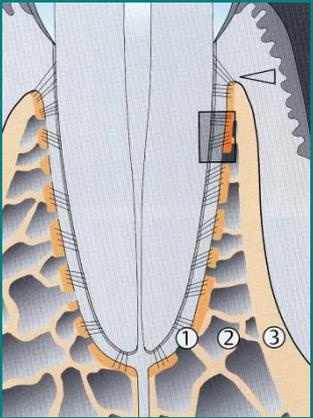
- they regeneration is also associated

(Hammarström, Heijl, 1997)



Alveolar bone

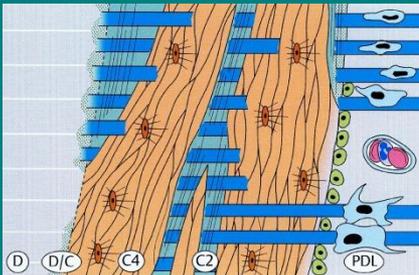
- mineral containment (mostly hydroxyapatite) : 60%



1. inner cortical bone, lamina cribriformis, lamina dura (rtg.)
2. spongiosa
3. outer cortical bone

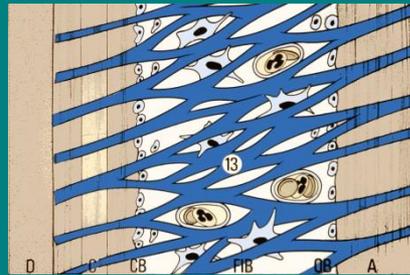
Cementum

- intrinsic fibers
- extrinsic fibers
- matrix, cellular elements

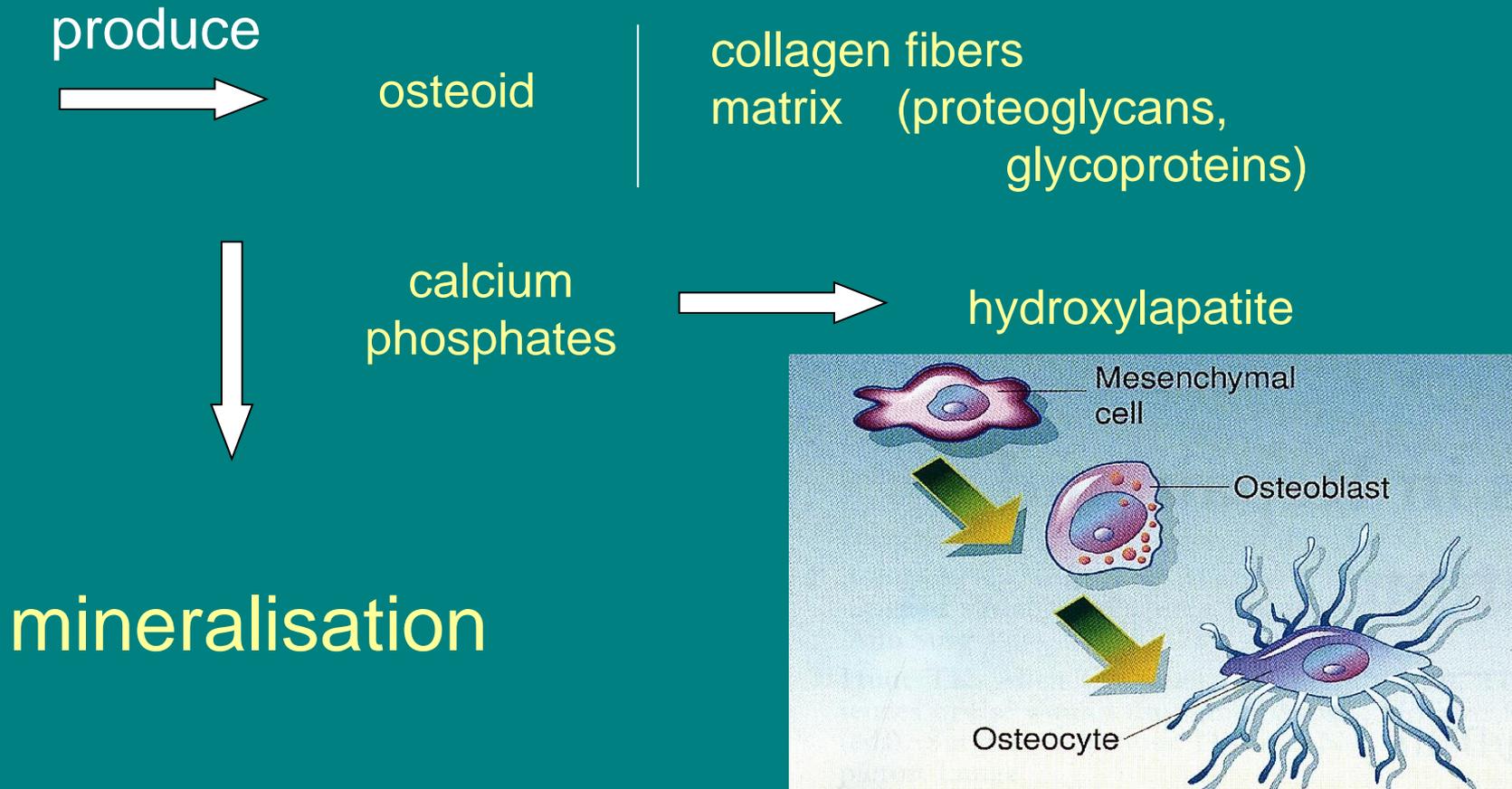


Periodontal ligament

- PDL fibers
- veins, nerves, cellular elements, receptors, transsudate



Osteoblasts



Firstly in the mineralising osteoid, and after in the bone „stucked” osteoblasts become: osteocytes
They communicate with the superficial osteoblasts by canalicules of the cytoplasmatic reticules

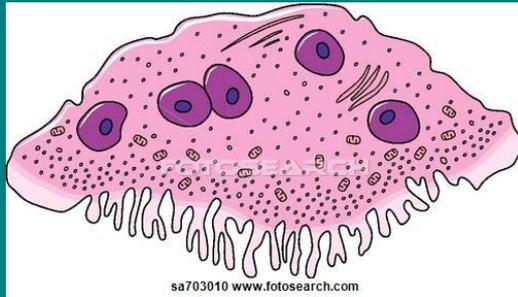
Osteoclasts (OCL)

- specialized in breakdown of mineralised bone, dentin- and cementum-matrix

- organic
- inorganic

resorbing materials

Resorption: OCL → creating acidic environment
(lactic acid, etc.)



↓
bone minerals are dissolving

Enzymes
OCL phagocytosis

remaining organic
tissue elimination

Dental plaque. Biofilm

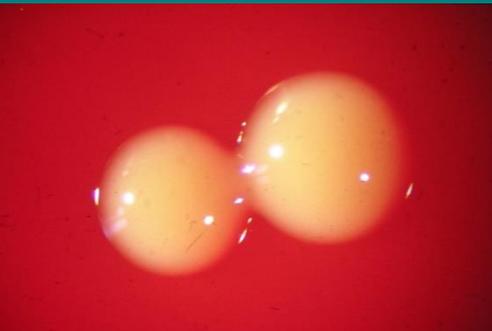
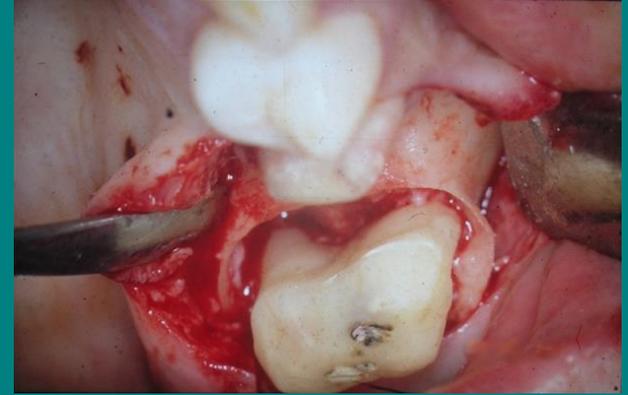
Local and general factors:



Periodontal destruction



A. A.



P. G.

- various bacteria-species and their products
 - need relative long time
- big number of bacteria-species (pocket: 400 types)
- bacterial interaction
 - risk patients
 - individual, specific medium

Progression of the gingival and periodontal inflammation

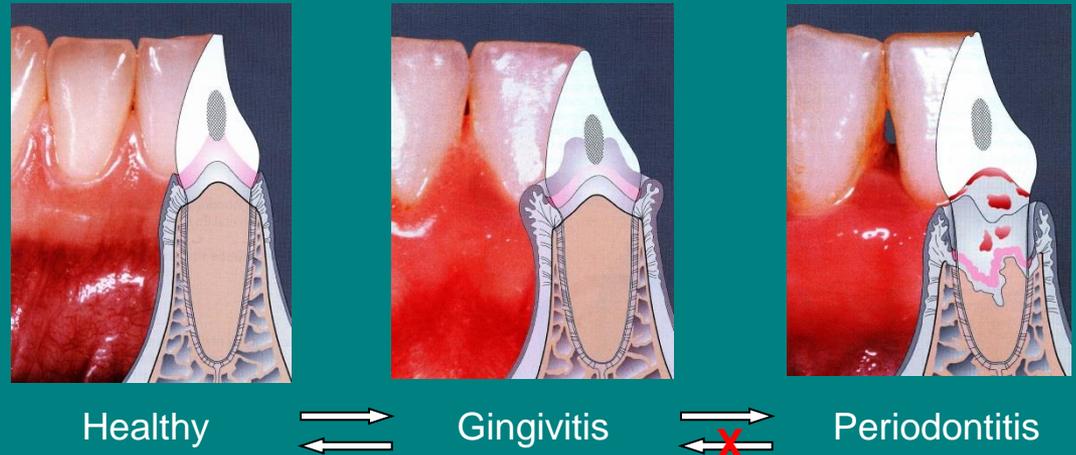
(clinical state, histopathology)

1. Initial lesion

2. Early lesion

3. Stable lesion

4. Advanced lesion



(Page & Schroeder, 1976)

1. Initial lesion

(1-4 days)

- **microvascular plexus** (junctional epithel
→ connective tissue)

- arteriolas
- capillaries
- veins

dilatation

- hydrostatic pressure ↑
- permeability ↑



Clinically healthy gingiva

plasmic proteins →

connective tissue →

sulcus fluid ↑

leukocyte migration ↑

junctional epithel

limfocyte: stay in the tissue

- antigenes
- cytokines
- adhessive molecules

↓
sulcus leukocytes

2. Early lesion

(after 7 days)

- capillaries positioned behind the junctional epithelium:

- wider dilatation

- growth in numbers



clinical symptoms

- **infiltrate: lymphocytes**

neutrophils

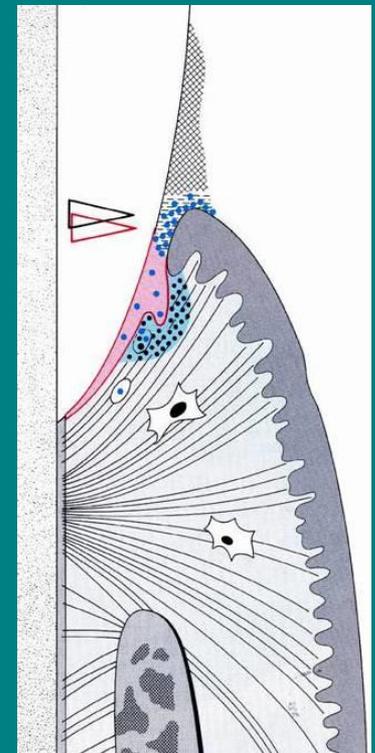
few plasmacells

* * *

- fibroblast degeneration

- collagen destruction

- **proliferation of the basal cells of the
epithelial attachment**



3. Stable lesion

- leukocyte migration and sulcus fluid ↑
→ clinically: *oedema*

- infiltrate: **plasmacell-dominance**

- collagen: continuous destruction

- dentogingival epithelium:
continuous proliferation

laterally
apically

- original epithelial junction's coronally part gets isolated from
tooth surface

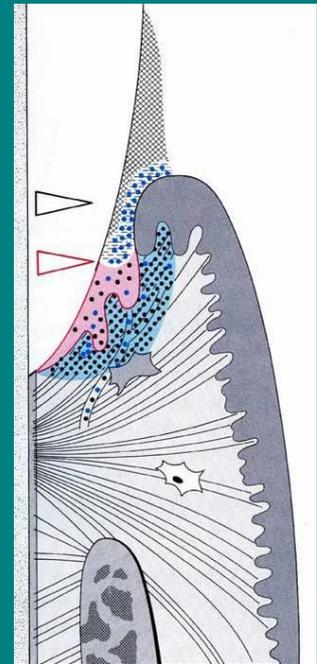
*

„pocket”

strong leukocyte migration
(mainly neutrophils)

a/ continuous stable lesion
b/ active, progressive stable lesion

more permeability,
then junctional epithelium



4. Advanced lesion

- pocket gets deeper, attachment moves apically from cemento-enamel junction
- stable lesion description: alveolar bone-loss : PDL destruction



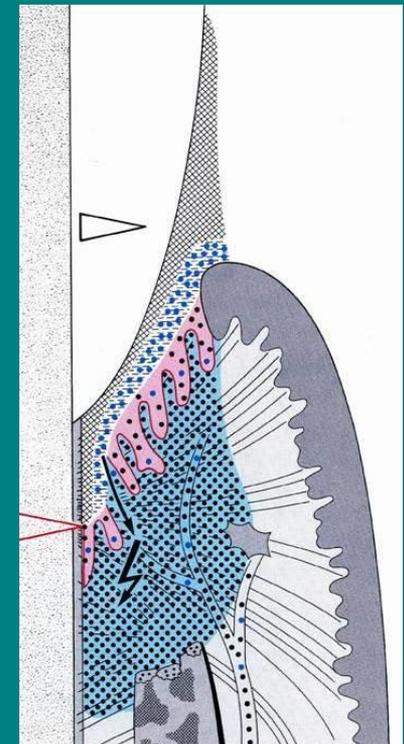
- wide tissue breakdown

inflammation
immunopathological
interactions

- strong infiltration

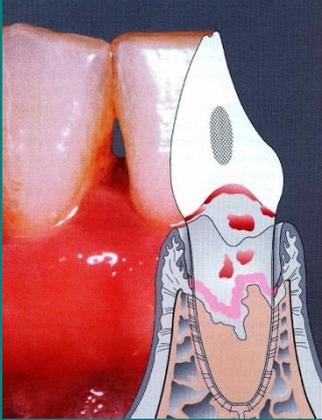
laterally
apically growing

- plasmacell dominance (> 50%)

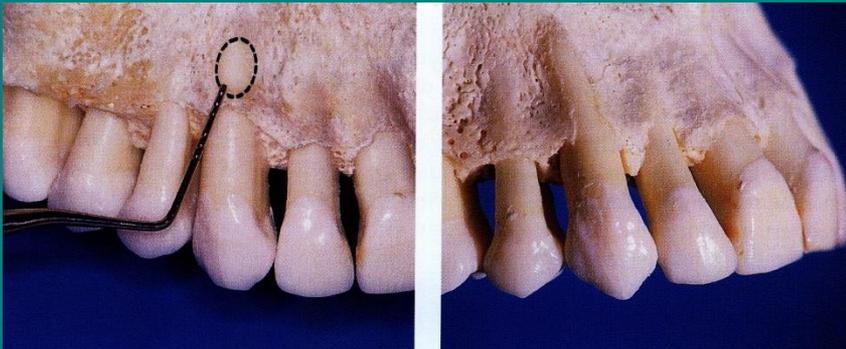
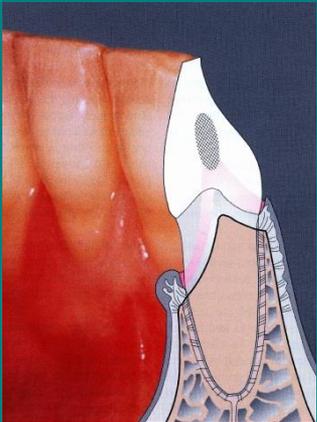


Periodontal defects

Periodontal pockets



Gingival recessions



Periodontal pockets

horizontal bone-loss

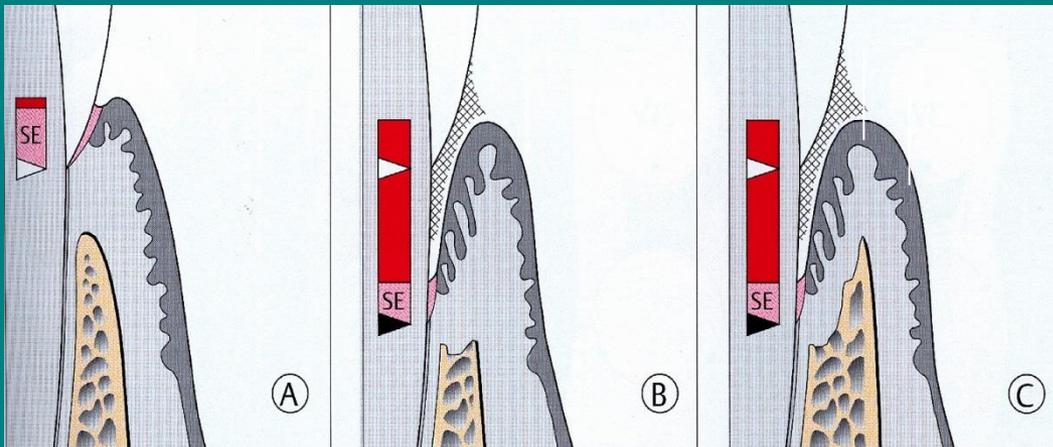
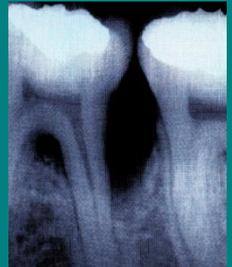


soft tissue pocket,
gingival pocket
(supra-alveolar pocket)

vertical bone-loss

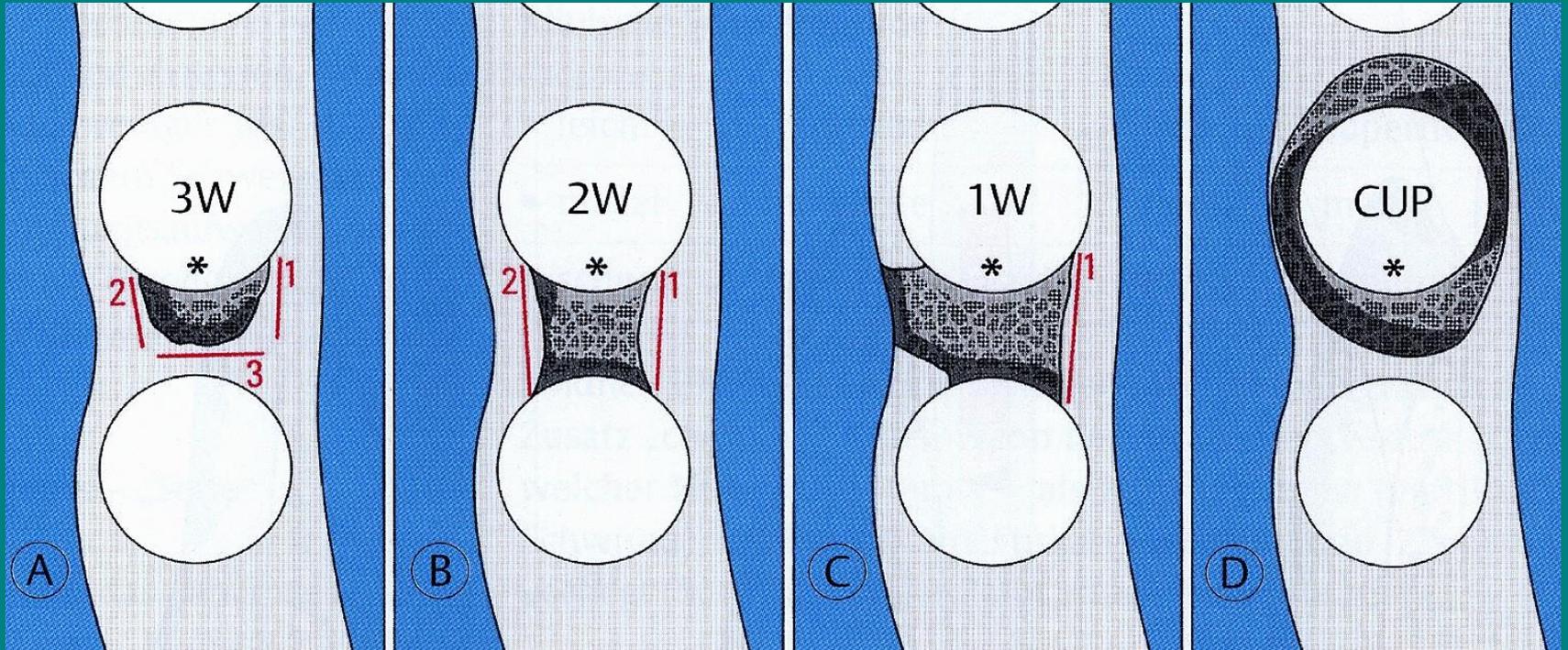


bony pocket,
(intra- or infra-alveolar
pocket)



- A. sulcus
- B. horizontal bone-loss
- C. vertical bone-loss

Bone defects. Bony pockets



3 walled

2 walled

1 walled

bone-crater

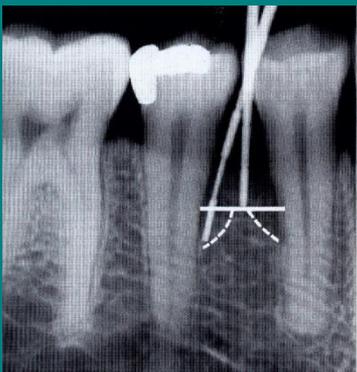
Bone pockets



No defect



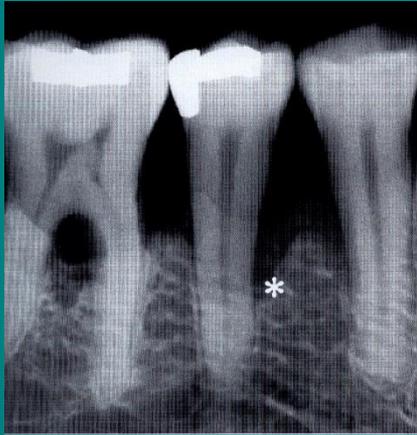
3 walled
pocket



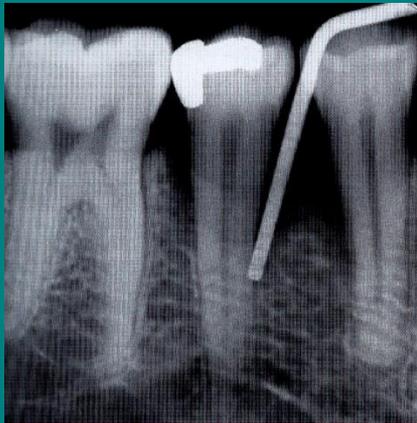
2 walled
pocket



Bone pockets



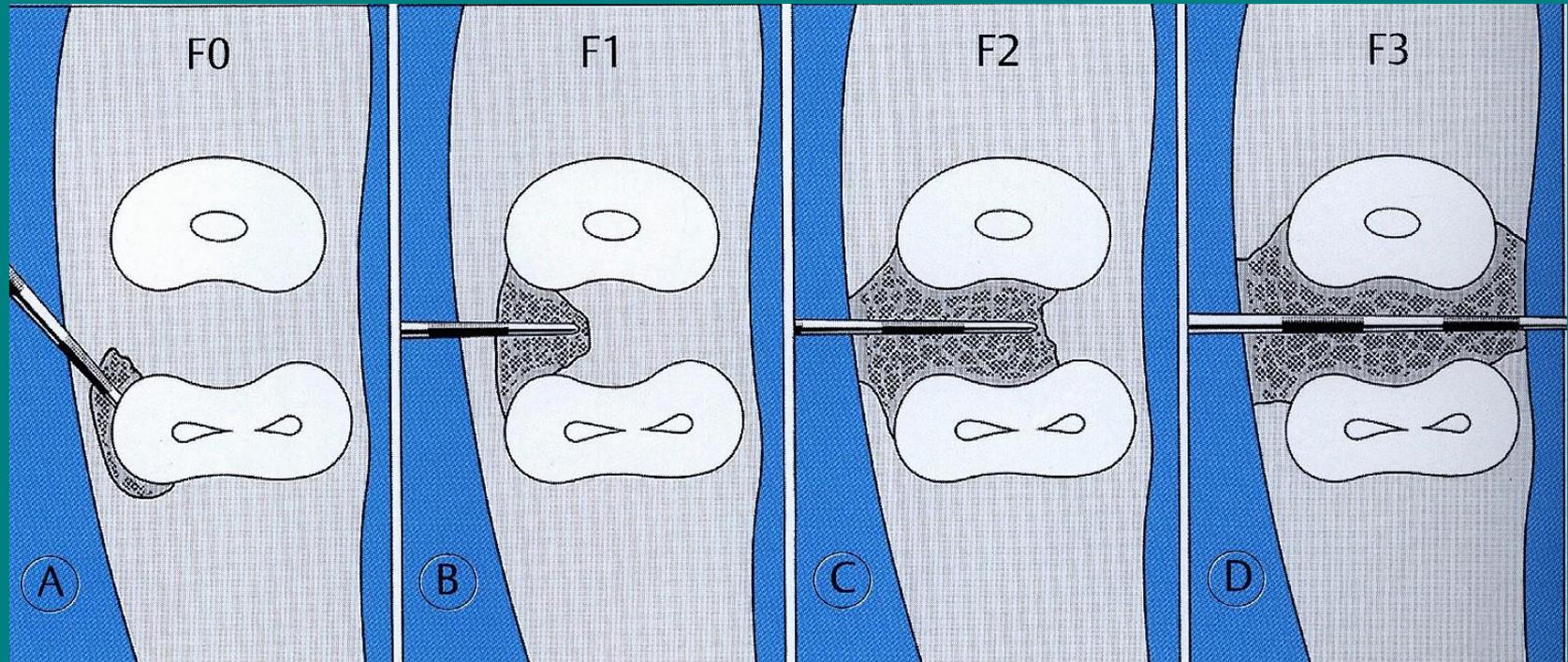
1 walled
pocket



combined
lesion



Furcation lesions



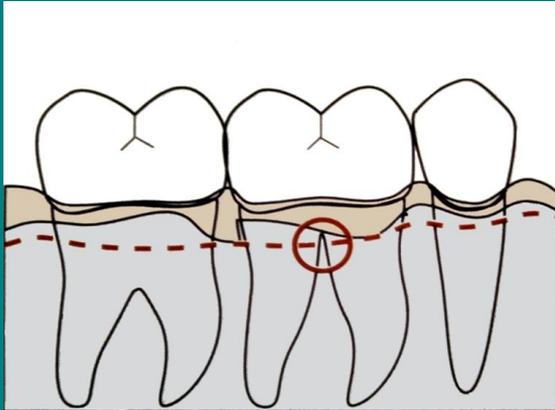
F0: 0 mm F1: <3 mm F2: >3 mm F3: \longleftrightarrow

(F0-F3: Hamp, 1975; A-C: Tarnow & Fletcher, 1984)

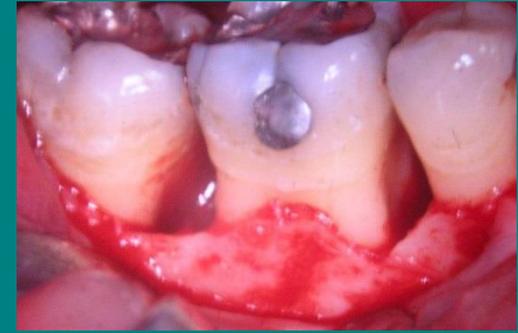
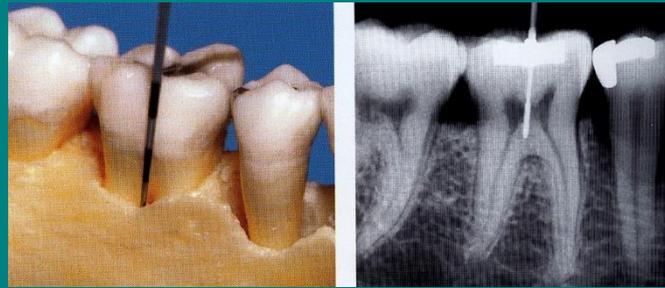


A: <3 mm
B: 4-6 mm
C: >7 mm

Furcation lesions

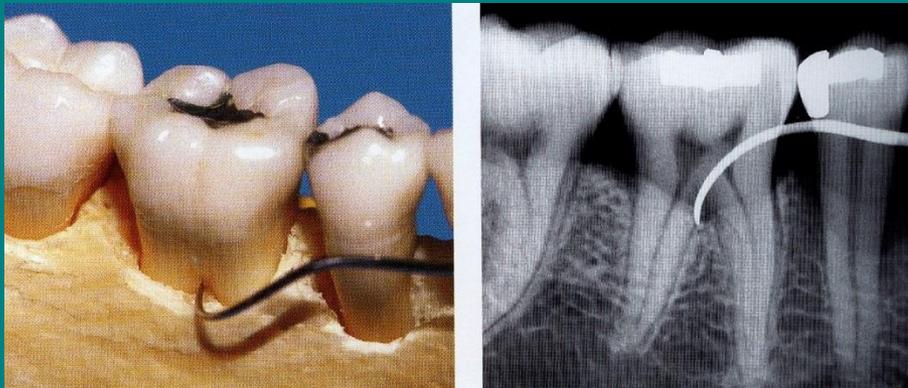


Probe P2N Nabers



F0

First grade furcation lesion (F1)



F1

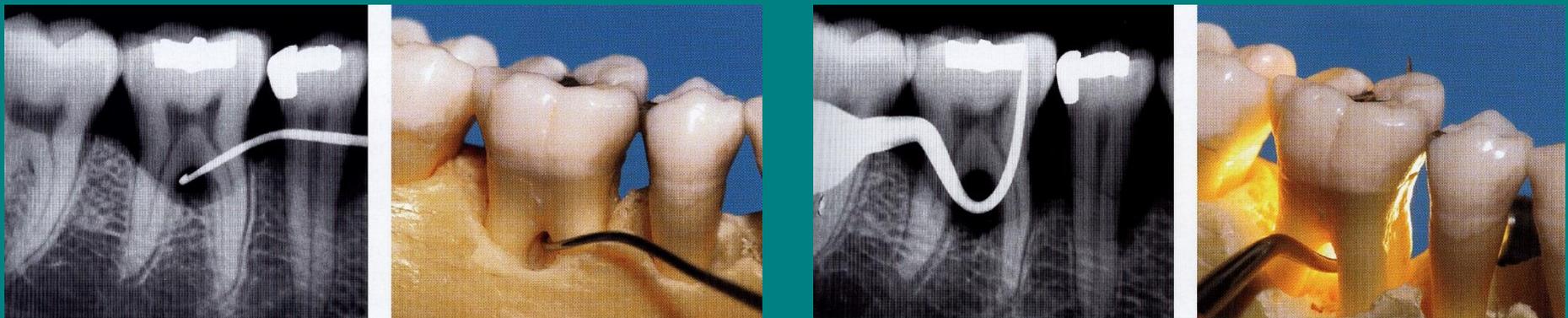


Furcation lesions

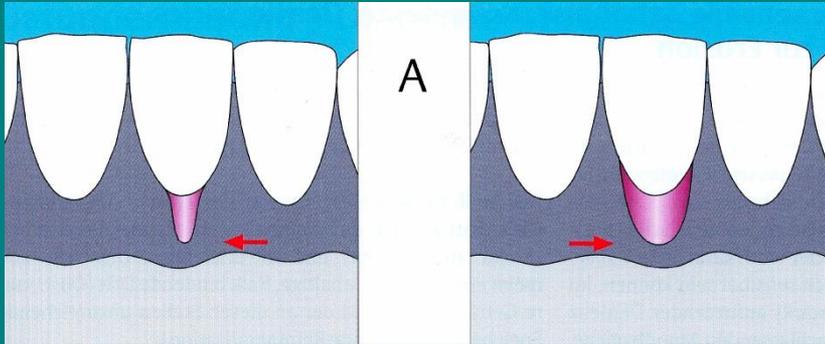
Second grade furcation lesion (F2)



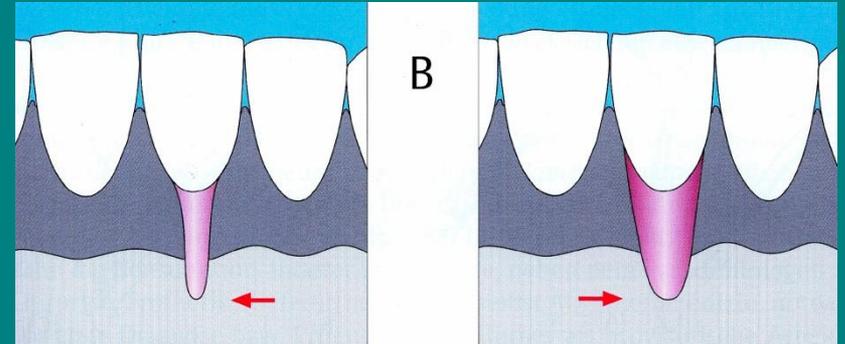
Third grade furcation lesion (F3)



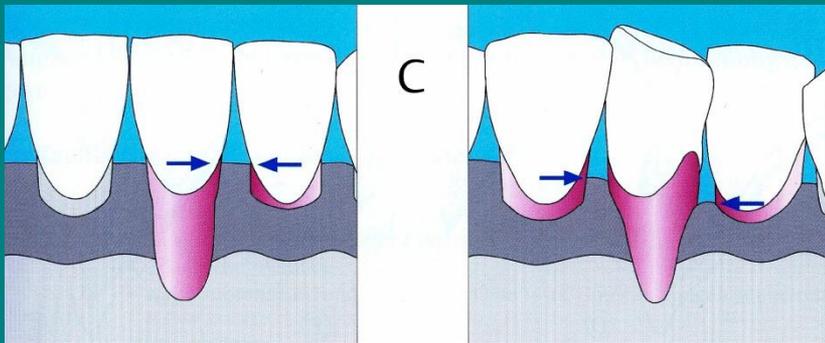
Gingival recessions



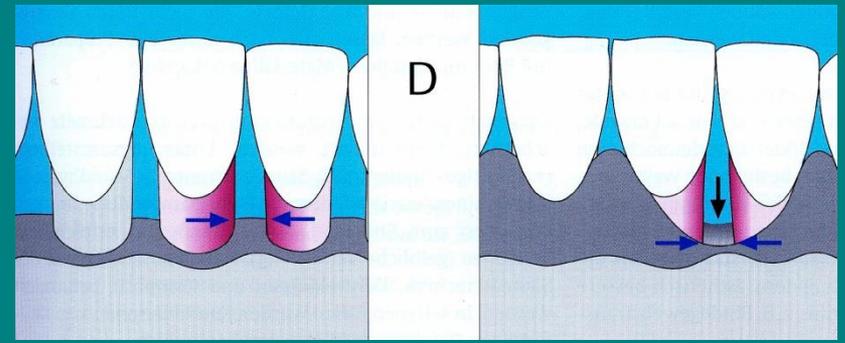
Miller I.



Miller II.



Miller III.



Miller IV.

Gingival recession

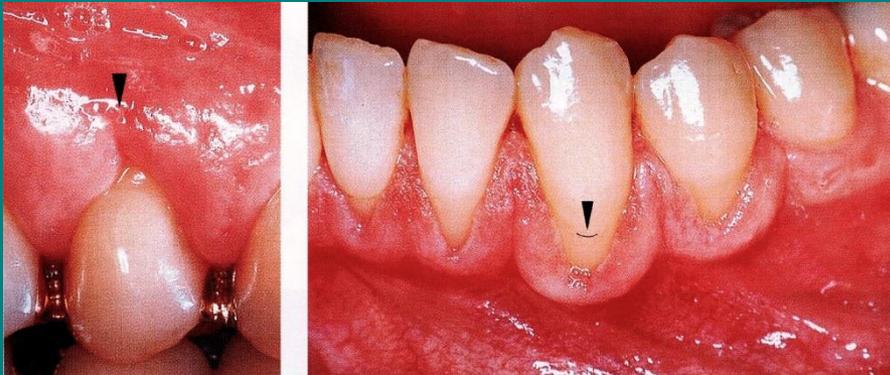
- Gingival biotypes



Localised recession



Generalised recession



Stillman crevice

McCall garland

Gingival recessions



Untreated periodontitis



Treated periodontitis



Age-related
gingival recession

Individual periodontal therapy

1. Conservative treatment phase

Hygiene

Provisories

Hygiene

- scaling
- root planing
- plaque control
- correction of restaurations
- curette

2. Corrective treatment phase

Periodontal surgery

Orthodontics

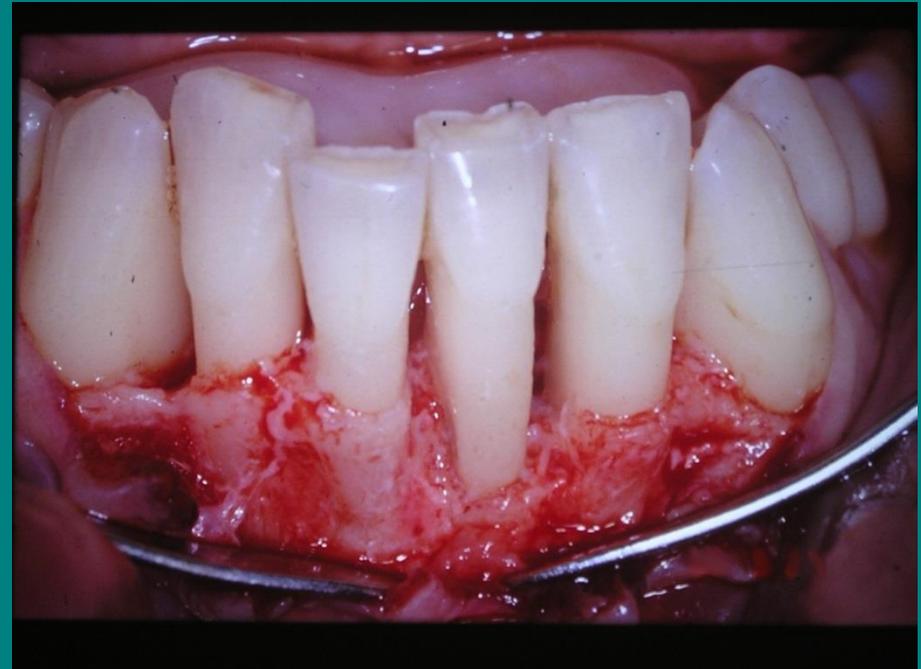
Prothetics

3. Maintenance treatment phase

„Re-call” (prevention)

Treatment of recurrences

Prothetics



Periodontal healing possibilities

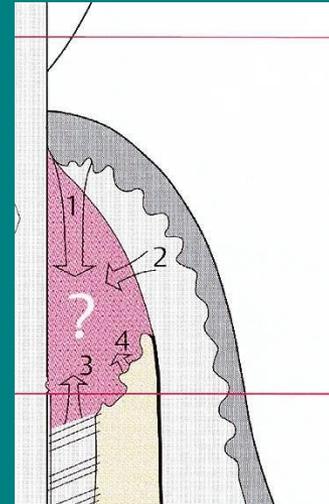
A) epithelial reattachment
(*reattachment*)

B) epithelial regeneration
(*new attachment*)

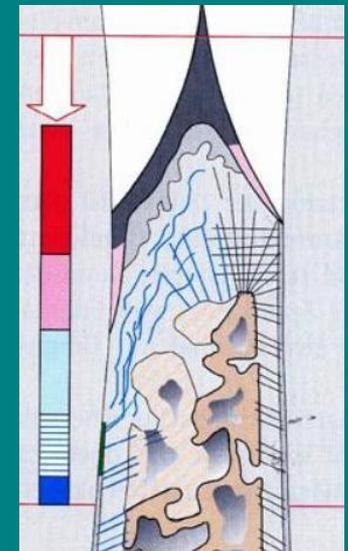
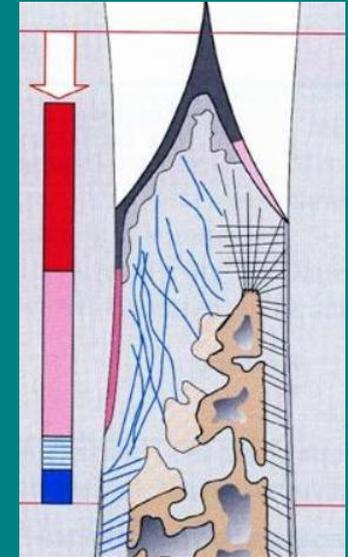
C) connective tissue reattachment
(*reattachment*)

D) connective tissue regeneration
(*new attachment*)

REPARATION



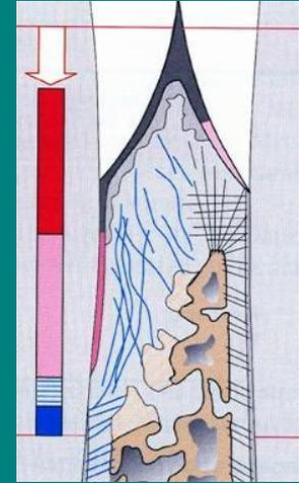
REGENERATION



Conventional healing methods. Reparation

A

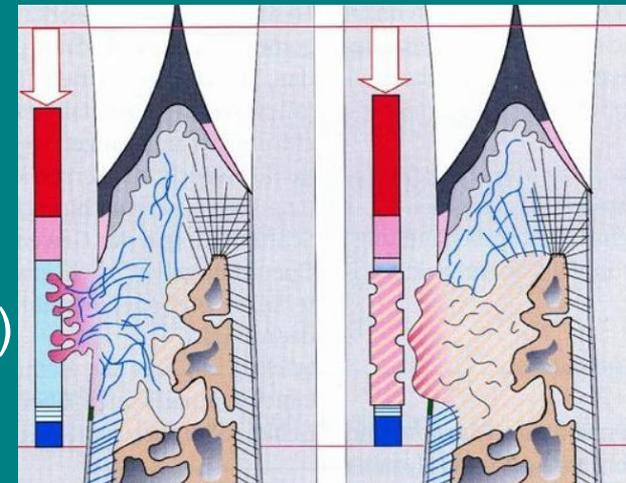
wide attachment (epithelial regeneration)
+
connective tissue reattachment (reattachment)
(PDLs)



Wide attachment

B

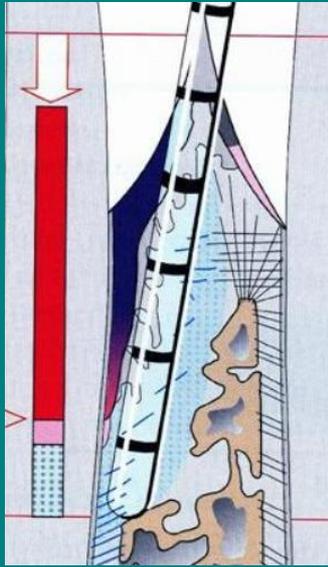
„wide” attachment
+
connective tissue adhesion on dentin
(→ **resorption**); (*gingival fibers*)
+
connective tissue regeneration (*bone*)
(→ **ankylosis**);
connective tissue regeneration (newly formed)
+
connective tissue reattachment
(PDLs)



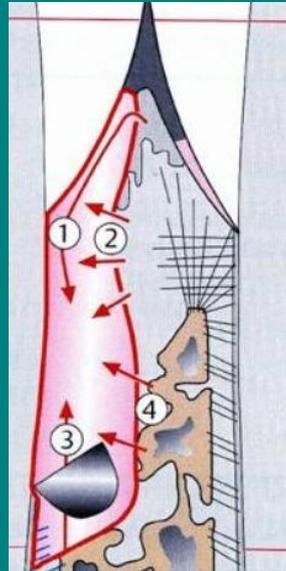
Resorption

Ankylosis

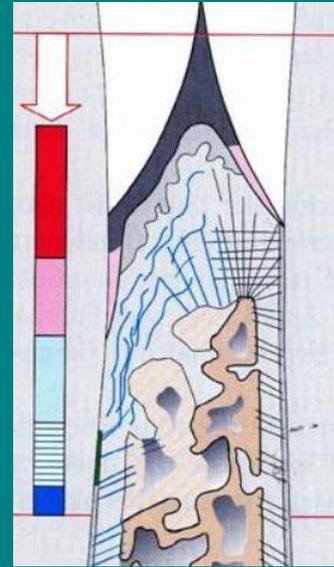
Regenerative healing methods. Regeneration



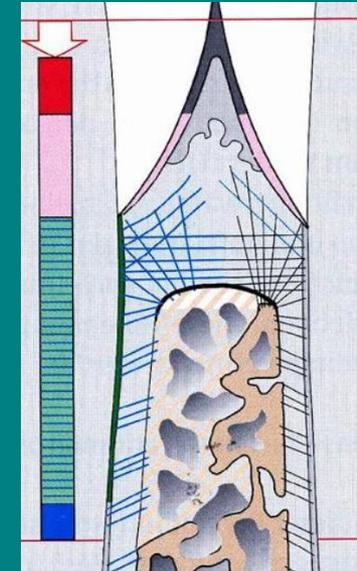
Bony pocket



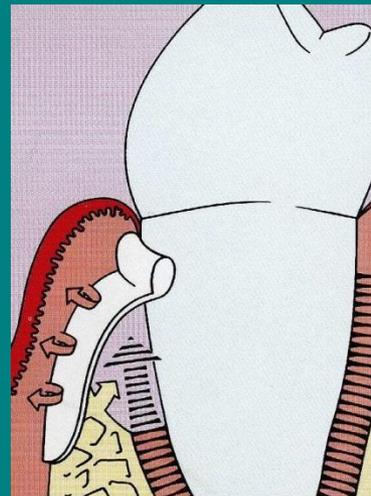
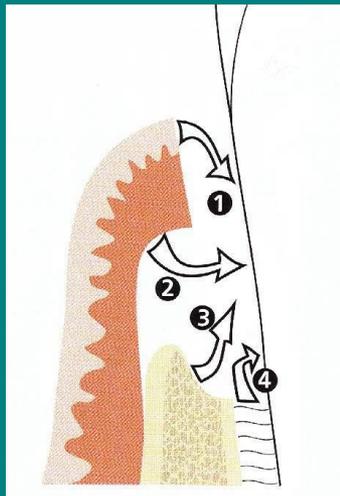
Healing



Regeneration

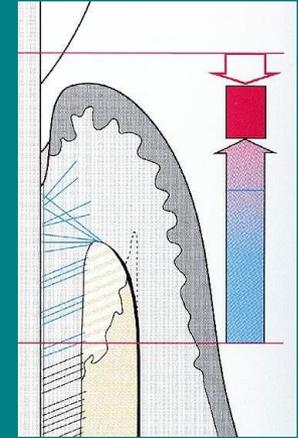
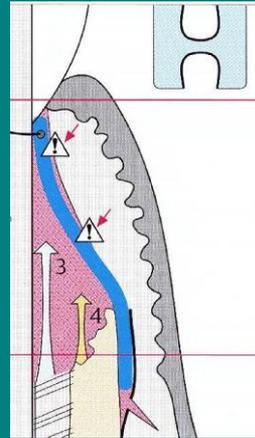
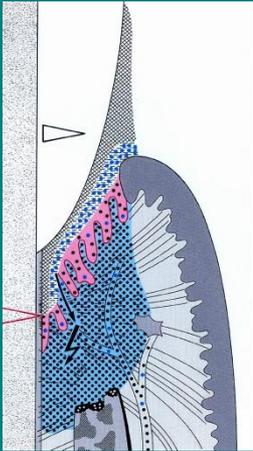


Utopia



The key to complex periodontal regeneration is to stop the apical growth of the gingival epithel mechanically, or biologically

Complex periodontal regeneration



„new attachment” through PDL, only when cementum covers the root surface



Regenerated PDLs have osteogene capacity



alveolar regeneration

new cementum



PDLs

Root surface

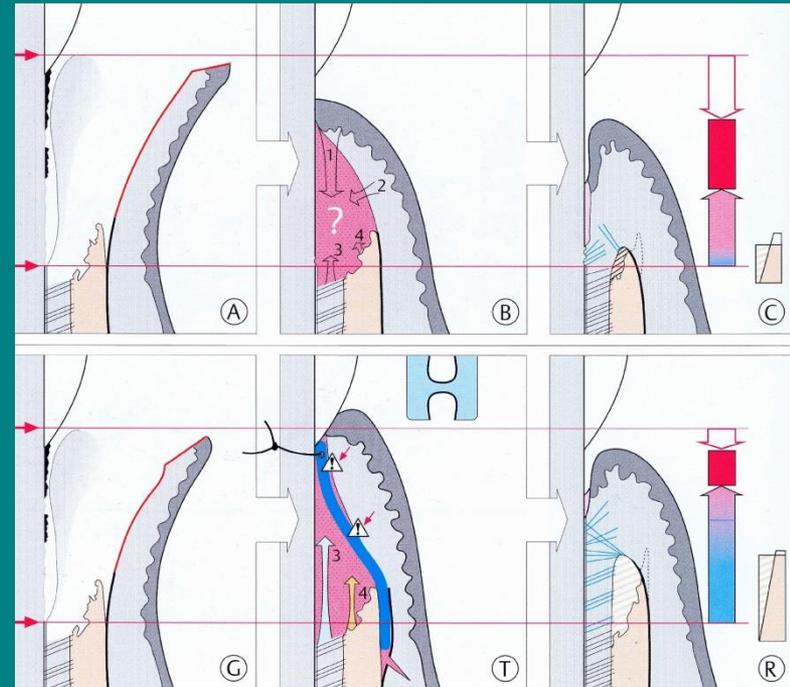


Periodontal surgery

1. Pocket surgery



- supraalveolar
 - intraalveolar
 - furcationlesion
-
- reparative
 - regenerative



2. Mucogingival surgery



- vestibule surgery / vestibuloplasty
- correction of gingival recessions

Periodontal surgery - Tasks

1. Subgingival scaling and root planing through direct view
2. Reduction or elimination of periodontal pockets
3. Stopping the inflammation and pocket-activity
4. Helping the periodontal tissues to regenerate
5. *Reestablishment of the physiological morphology of the marginal periodontal tissues and the mucogingival junction, correction of the mucogingival defects*

Factors:

- regenerative capacity of periodontium
- individual oral hygiene
- cooperation

during
Phase I.
therapy

Periodontal surgery

A

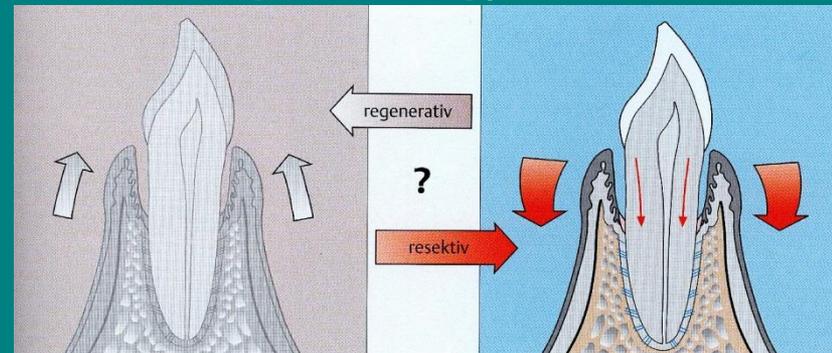
Standard, reparative surgeries

1. „New attachment” technique (ENAP), resective pocket surgery
2. Partially mobilised flap surgery, „open curettage”
(*modified Widman–flap*)
3. Fully mobilised flap surgery
(*apically repositioned flap*)
4. Combined and special surgery
(*„distal wedge” technique, grafts, crown lengthening*)

5. *Mucogingival surgery*

*

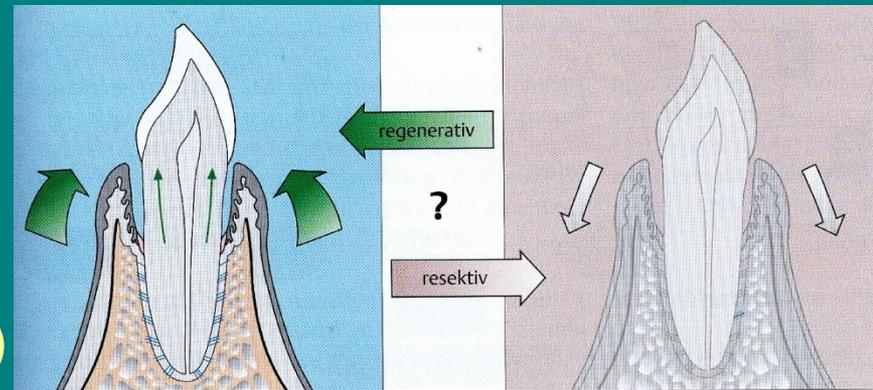
Resective surgery (1-4)



Periodontal surgery

B

Regenerative surgeries



1. Membrane technique (**GTR**)

2. Enamel-matrix derivatives (**EMD/EMP**)

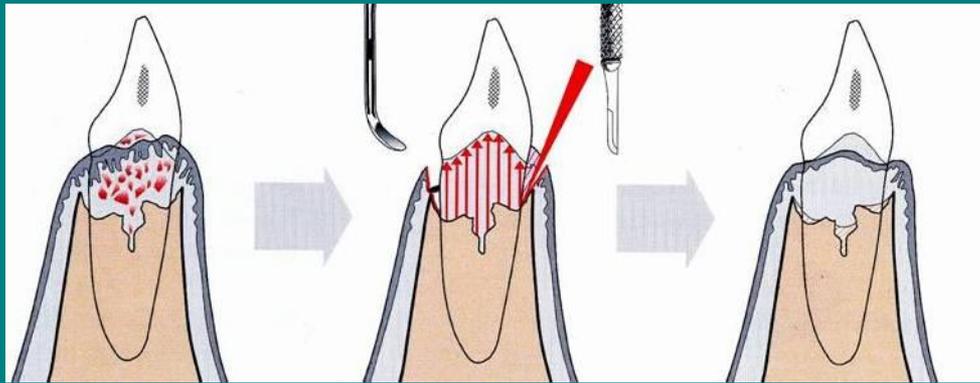
3. Combined surgery

4. Growth factors, hormones...

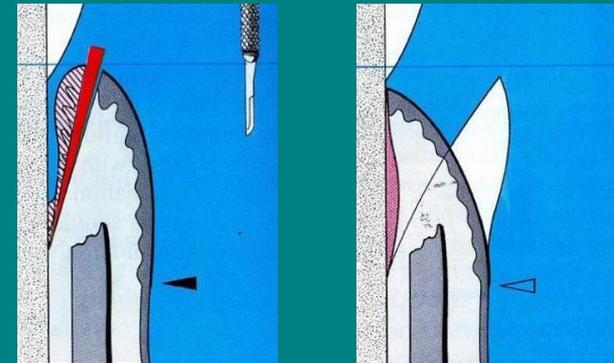
...stem cells → ?

Periodontal pocket surgery

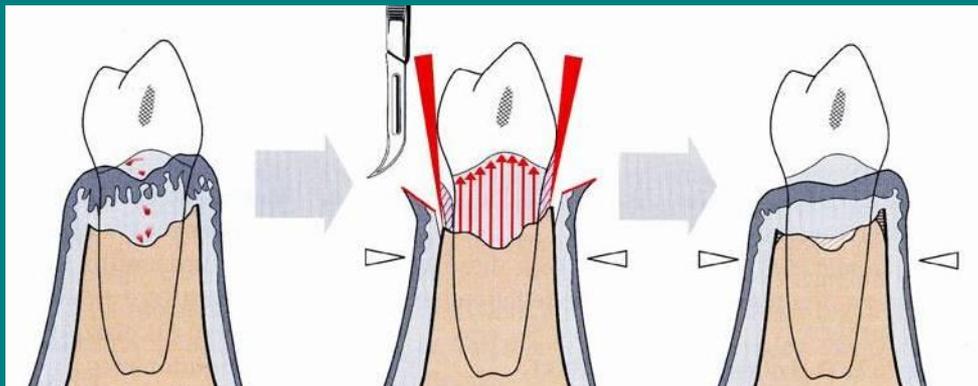
Supraalveolar pockets



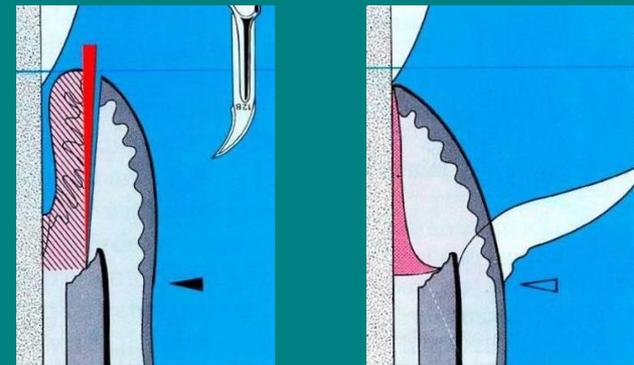
„New attachment” technique (curette/ENAP)



indication: horizontal bone-loss
PPD < 4-5 mm



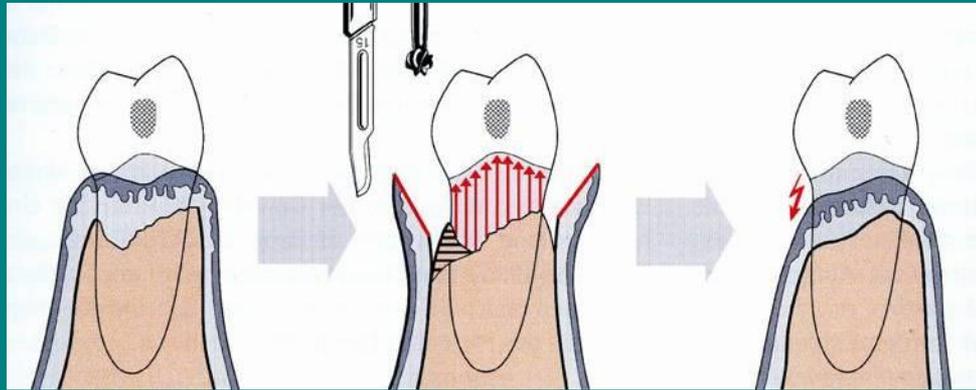
Modified Widman-flap technique (MWF)



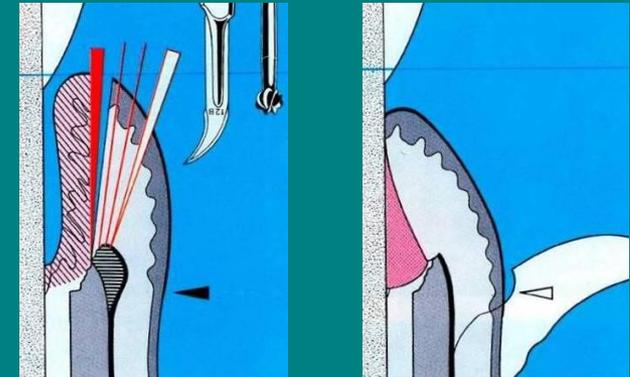
indication: horizontal bone-loss
PPD: 5-7 mm

Periodontal pocket surgery

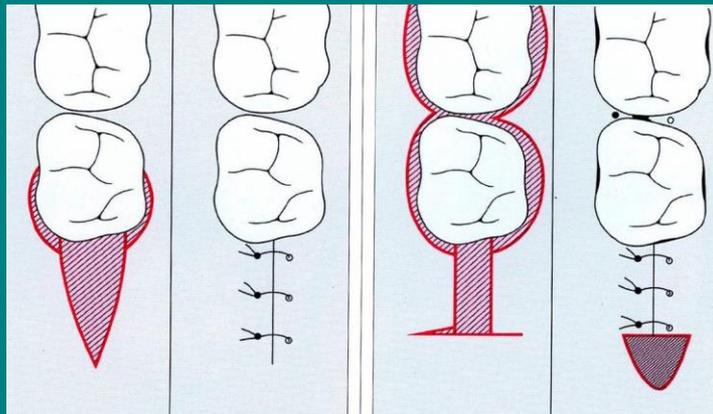
Supraalveolar pockets



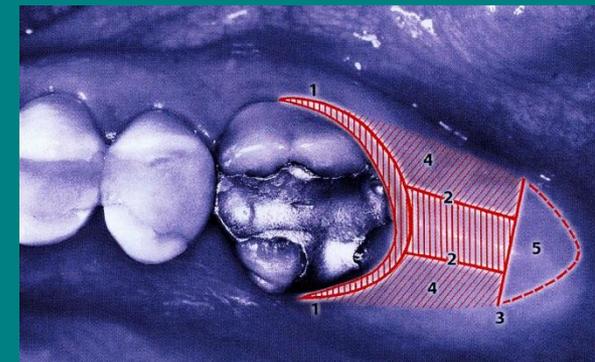
Apically repositioned flap technique



indication: horizontal bone-loss
PPD > 6-7 mm



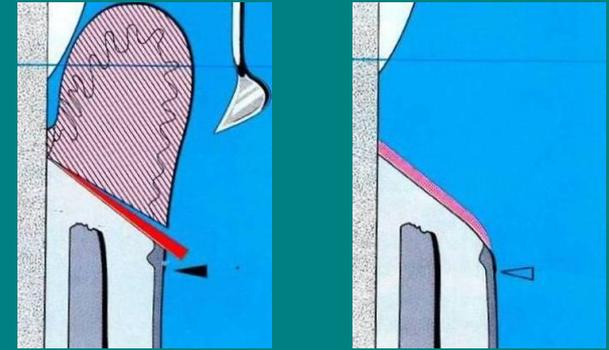
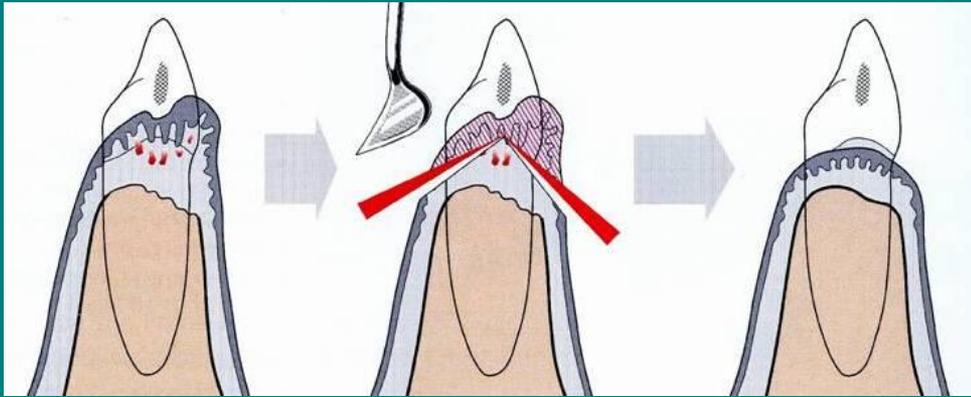
„Distal wedge” technique



indication: pocket distally from the last tooth

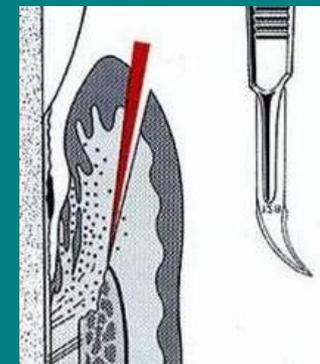
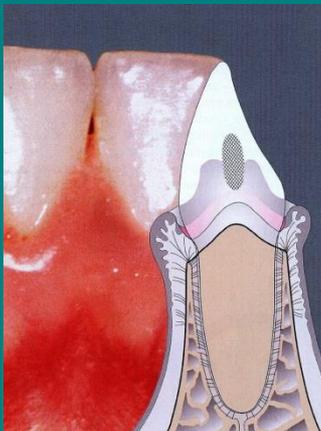
Periodontal pocket surgery

Supraalveolar pockets. Pseudopockets



indication: gingival hyperlasia, fibromatosis

Gingivectomy

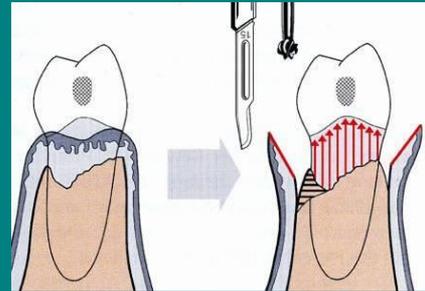


Internal gingivectomy

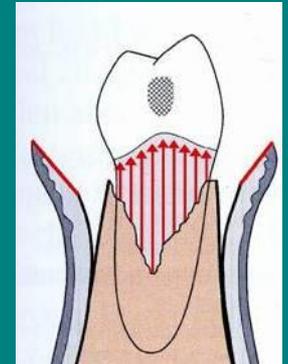
Periodontal pocket surgery

Intraalveolar pockets

1. Bone pocket curettage



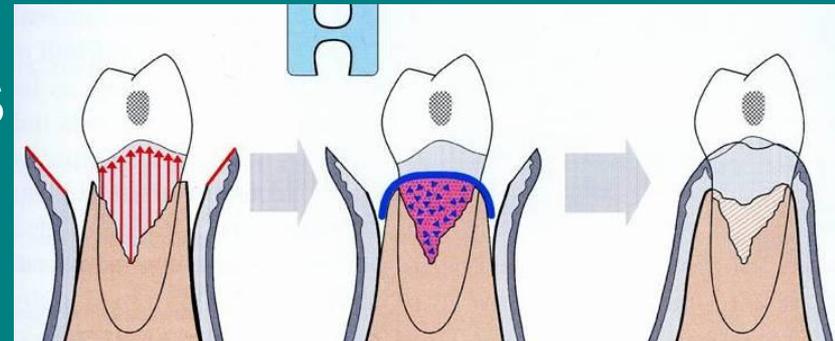
2. Bone substitutes -
implantation/transplantation



3. Regenerative possibilities

- mechanical
- biological/chemical

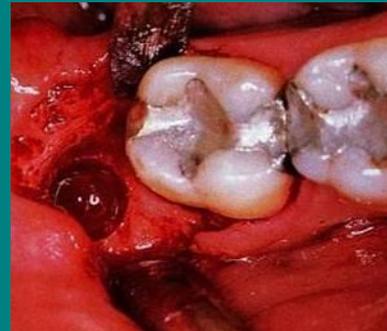
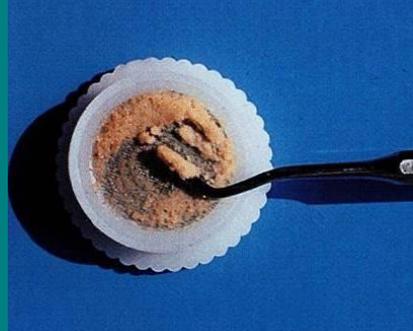
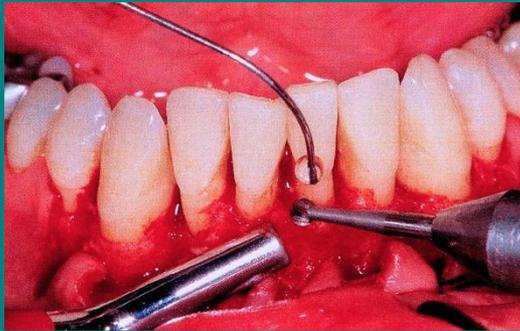
membranes



Periodontal pocket surgery

Intraalveolar pockets

1-2. Bone pocket curettage. Bone substitutes



Autogene bone



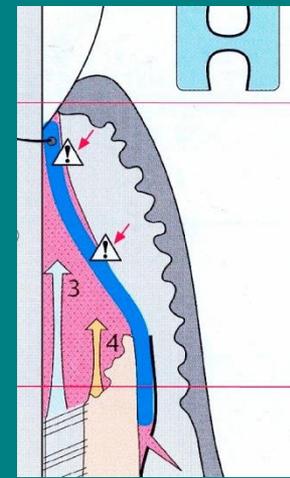
Alloplastic and xenogene bone substitutes

Periodontal pocket surgery

Intraalveolar pockets

3. Regenerative possibilities

3.1. Mechanical membranes (GTR)



Non-resorbable membranes



ePTFE membrane



ePTFE



Resorbable membranes



Collagen membrane



Polyglykolide

Periodontal pocket surgery

Intraalveolar pockets

3. Regenerative possibilities

3.2. Bio-chemical membranes (EMD)

Enamel-matrix derivatives



EDTA



EMD



EMD + graft

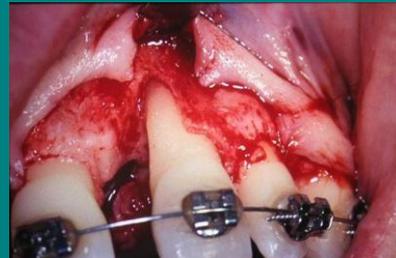
Periodontal pocket surgery

Intraalveolar pockets

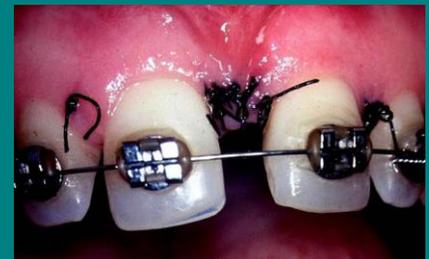
3. Regenerative possibilities

3.3. Growth factors (GDFs)

- platelet rich plasma, - fibrin, - gel
- recombinant growth factors / (PRP, PRF, PRG, rhGFs)



PRP



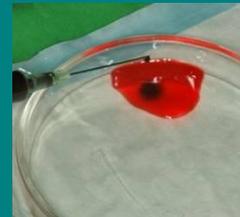
Periodontal pocket surgery

Intraalveolar pockets

3. Regenerative possibilities

3.3. Growth factors (GDFs)

- platelet rich plasma, - fibrin, - gel
- recombinant growth factors / (PRP, PRF, PRG, rhGFs)

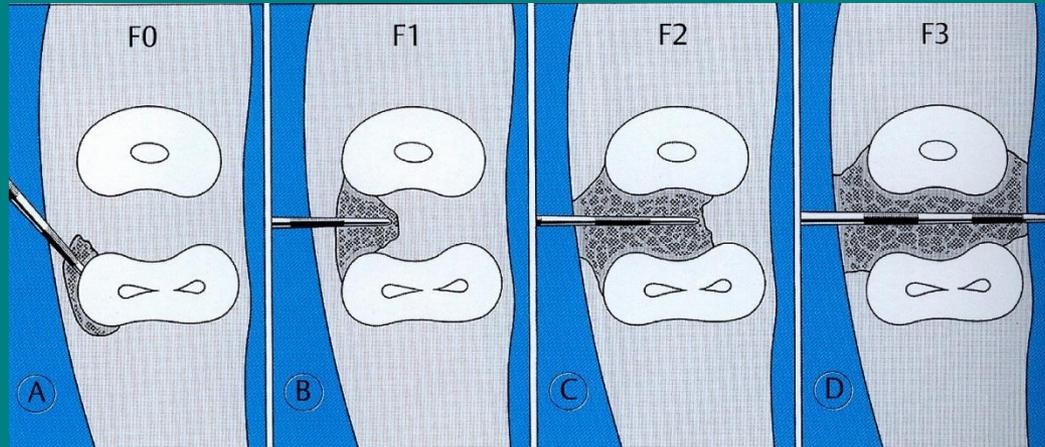


PRP + calcium
+ fresh blood



PRG

Principles of furcation lesion therapy



First grade furcation lesion (F1)



F0

- scaling
- root planing
- furcationplastique



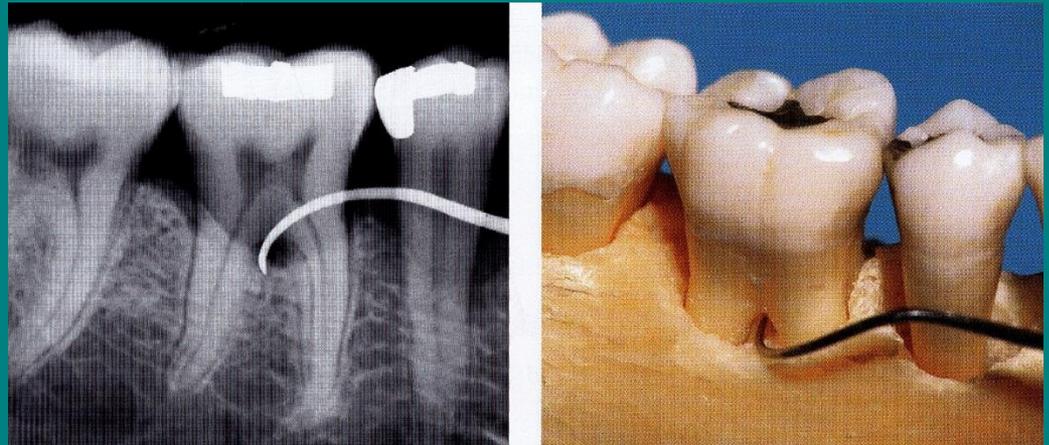
F1

Principles of furcation lesion therapy

Second grade furcation lesion (F2)



- furcationplastique
- tunnel preparation
- transplantation/implantation
- GTR, biological mediators
- root resection/hemisection
- extraction

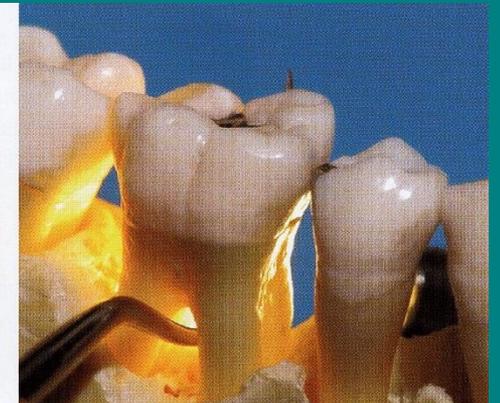
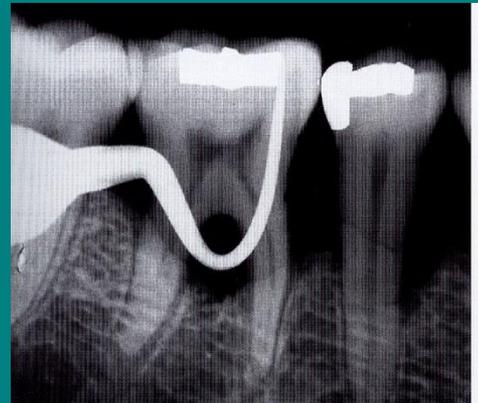


Principles of furcation lesion therapy

Third grade furcation lesion (F3)



- tunnel preparation
- GTR? Grafts?
- root resection
- hemisection
- extraction

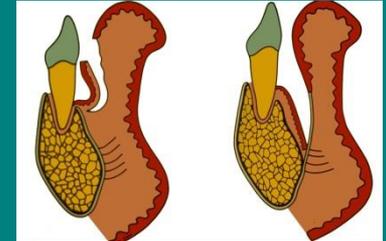
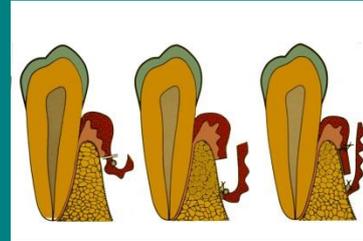


Mucogigival surgery

1. Preventive surgery

1.1 Frenulotomy/frenulectomy

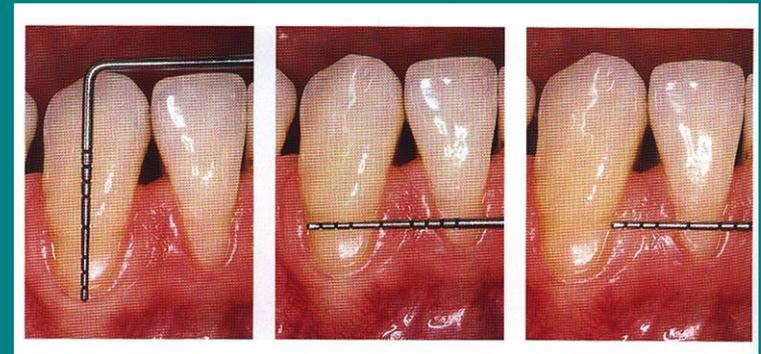
1.2 Vestibule surgery

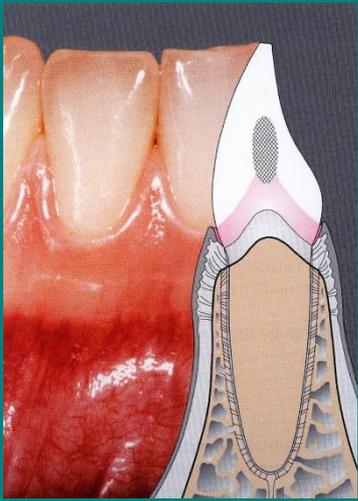


2. Corrective surgery

2.1 Vestibule surgery

2.2 Gingival recession surgery





DCDM A

