PERIODONTAL POCKET
"10 mm bony pocket (active)"

In this severely abraded dentition, probing with very light pressure leads to probe tip penetration beyond the base of the soft tissue pocket, through the pocket epithelium, until contact is made with the bone. The radiograph reveals the vertical osseous defect.

Hemorrhage and purulence from the pocket are typical signs of an acute exacerbation of inflammatory periodontal disease. These symptoms of current pocket activity are more important than pocket depth.
4. Incomplete removal of calculus during periodontal treatment. The gingival wall occluding the pocket orifice and periodontal abscess occurs in the sealed portion of the pocket.

5. After trauma to the tooth with perforation of the lateral wall of root in endodontic therapy.
Oral epithelium (keratinized)
Pocket epithelium
Pocket
Calculus (covered with plaque)
Ulcerated pocket epithelium
Inflammatory infiltrate
Subepithelial connective tissue
Junctional epithelium
Cementum
Dentin
PERIODONTAL POCKET

- DEFINITION: It is defined as a pathologically deepened gingival sulcus.
- It is the most important clinical feature of Periodontal disease.
CLASSIFICATION

Deepening of the gingival sulcus may occur by:-

✓ Coronal movement of gingival margin
✓ Apical displacement of the gingival attachment
✓ Combination of the 2 processes
A. ACCORDING TO THE BASE OF THE POCKET TO ALVEOLAR BONE

1. GINGIVAL POCKET – (PSEUDOPOCKET)
   Formed by gingival enlargement without destruction of the underlying periodontal tissue. The sulcus is deepened because of the increased bulk of the gingiva.

2. TRUE POCKET – (PERIODONTAL POCKET)
   Occurs with destruction of supporting periodontal tissues.
   This can be further classified as:
CLASSIFICATION

- A general classification of periodontal pockets may be:
  - Depending upon its relationship to crestal bone:
    - Suprabony/supracrestal/ supra-alveolar pocket.
    - Infrabony/intrabony/subcrestal/intra-alveolar pocket.
  - Depending upon the number of surfaces involved:
    - Simple pocket - involving one tooth surface.
    - Compound pocket - involving two or more tooth surfaces.
    - Complex pocket - where the base of the pocket is not in direct communication with the gingival margin. It is also known as spiral pocket.
CLASSIFICATION

- Depending upon the nature of the soft tissue wall of the pocket.
  - Edematous pocket.
  - Fibrotic pocket.

- Depending upon the disease activity
  - Active pocket.
  - Inactive pocket.
TYPES OF PERIODONTAL POCKETS
**Periodontal Pockets**

- **Types of pockets**
  - **A. Normal sulcus**
    Apical termination of the JE is at the cementoenamel junction (arrow).
  - **B. Suprabony pocket**
    Proliferating pocket epithelium. A remnant of junctional epithelium persists (pink).
  - **C. Infrabony pocket**
    Extends beyond alveolar crest.
B. ACCORDING TO NUMBER OF TOOTH SURFACES INVOLVED

1. SIMPLE POCKET - Involves only one surface of tooth.
2. COMPOUND POCKET - Involves 2 or more surfaces of the tooth.
3. COMPOUND POCKET (SPIRAL) - Pockets originating on one tooth surface and twisting around tooth to involve 1 or more additional surfaces. In these pockets orifice is on 1 surface and base on the other.
Klinsberg 1971

CLASS I  CENTRAL

CLASS II

CLASS III / UNILATERAL-CENTRAL

CLASS II / BILATERAL CENTRAL
Pockets adjacent to edentulous areas

- **Class I / Central Lesions:**
  - Are lesions where the pocket is confined to the center of the two proximal margins.

- **Class II lesions:**
  - Are lesions where the pocket is located at a corner but does not include the central portion.

- **Class III lesions / Unilateral central lesions:**
  - Are where the pocket encompasses one corner & the central area of the defect.

- **Class IV / Bilateral central lesions:**
  - Are where it encompasses both the proximal areas & the central surface as well.
SYMPTOMS

- Localized pain or a sensation of pressure after eating gradually diminishes.
- Foul taste in localized areas.
- Tendency to suck material from the interproximal spaces.
- Radiating pain deep in the jaws.
- Gnawing feeling / feeling of itchiness in the gums.
- urge to dig a pointed instrument into the gums with relief obtained from the resultant bleeding.
- Complaints that food sticks between the teeth or
- teeth feel loose or
- a preference to eat on the other side.
- Sensitivity to heat and cold, toothache in the absence of caries.
CLINICAL FEATURES

- Gingiva is bluish red in colour.
- Thickened marginal gingiva
- A bluish red vertical zone extends from the gingival margin to alveolar mucosa.
- Gingival bleeding and suppuration
- Tooth mobility and diastema formation
- Localized pain or pain that appears to be deep in bone.
- Depth of pockets can be determined using periodontal probes.
INITIAL LESION

- Inflammation of CT wall of gingival sulcus in response to a bacterial challenge.

The cellular and fluid inflammatory exudate causes degeneration of surrounding CT including the gingival fibres.

Apical to JE, collagen fibres are destroyed and the area becomes occupied by inflammatory cells and edema. There are 2 mechanisms associated with collagen loss:
Collagenases and other enzymes secreted by various cells in healthy and inflamed tissue, such as fibroblasts, PMN’s and macrophages, become extracellular and destroy collagen.

By extending cytoplasmic processes to the ligament-cementum interface and degrade the inserted collagen fibrils and the fibrils of the cementum matrix.

As a consequence of the loss of collagen, the apical cells of the JE proliferate along the root, extending fingerlike projections 2 or three cells in thickness.

The coronal portion of the JE detaches from the root as the apical portion migrates. PMN’s invade the coronal end of JE in increasing numbers. When volume of PMN’s reaches 60% or more of the JE, the tissue loses cohesiveness and detaches from tooth surfaces.
a. CT is edematous and is densely infiltrated by plasma cells (80% of the plasma cells occupy the soft tissue wall).

b. The blood vessels are increased in number, dilated and engorged.

c. CT shows proliferation of endothelial cells with newly formed capillaries and collagen fibres.

d. The length of JE is decreased to 50-100um.

e. Epithelial buds or interlacing cords of epithelial cells project from the lateral wall into the adjacent inflamed CT and may extend farther apically towards JE.

f. These epithelial projections are densely infiltrated by leucocytes and edema from inflammed CT.

g. The cells undergo vacuolar degeneration and rupture to form vesicles.

h. Ulceration of lateral wall exposing the underlying inflammed CT.

i. The epithelium at the gingival crest of a periodontal pocket is generally intact and thickened, with prominent rete pegs.
MICROTOPOGRAPHY OF GINGIVAL WALL

- AREAS OF RELATIVE QUIESCENCE
- AREAS OF BACTERIAL ACCUMULATION
- AREAS OF EMERGENCE OF LEUKOCYTES
- AREAS OF LEUKOCYTE-BACTERIA INTERACTION
- AREAS OF INTENSE EPITHELIAL DESQUAMATION
- AREAS OF ULCERATION
- AREAS OF HEMORRHAGE
Three types of areas can be found on root surfaces:

1. **Areas of Increased Mineralization**
   - The areas of root or cementum that are exposed to the oral cavity become mineralized as the minerals such as Ca, Mg, P, and fluorides from the saliva get deposited on the exposed cementum.

2. **Areas of Demineralization**
   - It is related to root caries, exposure to oral fluids, and as a result of periodontal attachment loss, undergoes the following changes.

[II] **Root surface wall of the pocket**

- Root surface forms the medial wall of the pocket.

- The root surface that gets exposed to the oral environment, as a result of periodontal attachment loss, undergoes the following changes:
  - Structural changes
  - Chemical changes
  - Cytotoxic changes
Structural changes

Exposure of cementum to the oral environment

Minerals present in saliva tend to get deposited on cementum surface ($\text{Ca}^{+2}$, $\text{F}^-$, etc.)

Area of Hyper mineralization

Root surface is exposed to oral fluids and bacterial plaque

Proteolysis of embedded remnants of Sharpey’s fibers

Areas of demineralization

Root caries (Yellowish or light brown patch)

Soft and lethargy on probing

Patient feels severe sensitivity to thermal changes and sweets

Pulp exposure may occur in severe forms
Note: Dominant micro organism in root surface caries is *actinomyces viscosus*.

**Chemical changes**

Cementum exposed to saliva may absorb calcium, phosphorus, magnesium and fluoride.

Increased mineral content of the root surface alters the chemical composition of the cementum, making it resistant to dental caries.

**Cytotoxic changes**

Histologic studies of periodontally involved cementum have shown the presence of bacteria in the cementum or endotoinis in the cementum.
SURFACE MORPHOLOGY OF TOOTH UNDER SEM
PERIODONTAL POCKETS AS HEALING LESIONS

- Periodontal pockets are inflammatory lesions and constantly undergoing repair.
- Complete healing does not occur because of persistence of bacterial attack which continues to stimulate an inflammatory response causing degeneration of new tissues.

Oedematous pocket wall

When the inflammatory component predominates, the lateral wall appears soft, oedematous friable, with a smooth shiny surface and bluish red discoloration.

Fibrotic pocket wall

When reparative changes predominate, the gingiva appears fibrotic and pink.

Note: In some cases, the outer surface of the soft tissue wall is fibrotic while the inner surface is inflamed and ulcerated.
CONTENTS OF POCKET

Microorganisms

Bacterial products (enzymes and endotoxins)

GCF

Remnants of food

Salivary mucin

Desquamated epithelial cells

Leukocytes

Purulent exudates may be present (sec. sign)

  Eg. deep pocket may have little or no pus and shallow pocket may have extensive pus formation so pus is not an indication of the depth of the pocket.
SIGNIFICANCE OF PUS FORMATION

1. Pus is only a secondary sign.

2. It is not an indication of depth of pocket or severity of destruction i.e. a shallow pocket may be having pus whereas deep pockets may not have.
NON SURGICAL TREATMENT

**Scaling**—cleans the teeth to remove deposits above and below the gumline

**Root planing**—smoothes rough root surfaces so the gum can heal

**Oral irrigation**—directs liquid below the gumline to flush out and kill germs and allow the regrowth of healthy tissue
The usual treatment sequence after proper diagnosis and documentation is performed is:

**SCALING and ROOT PLANING**

**SCALING** consists of removing the hard calculus and plaque around the collar of the tooth as well as below the gum line.

**ROOT PLANING** removes the calculus and plaque off the root surface wall below the gum line (into the pocket). Depending on the case, these procedures may or may not require anesthesia. Hand instruments called scalers as well as high-frequency polishers will be used to accomplish a complete and thorough job.
Subgingival scaling procedure.

Instrumentation for calculus removal.
ULTRASONIC SCALING

Ultrasonic scaling instruments can be used to dislodge the calculus above the gum.
Hand instruments can be used for scaling.
USE OF ANTIBIOTICS IN PERIODONTAL THERAPY

1. Broad spectrum antibiotics like Penicillin (amoxicillin, augmentin) are indicated in LAP, GAP, MRP, RP.

2. Metronidazole is indicated in cases of LAP, GAP, MRP, RP, AP, NUG.

3. Antibiotics are selected on basis of microbial composition of plaque, patient’s medical status and current medications.

4. Antibiotics have shown to have value in reducing the need for periodontal surgery in patients with chronic periodontitis.
<table>
<thead>
<tr>
<th></th>
<th>Regimen</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SINGLE AGENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole</td>
<td>250-500mg 3 times daily</td>
<td>8 days</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>500mg 2 times daily</td>
<td>8 days</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>300mg 2 times daily</td>
<td>8 days</td>
</tr>
<tr>
<td><strong>COMBINATION THERAPY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole/Amoxicillin</td>
<td>250mg of each 3 times daily</td>
<td>8 days</td>
</tr>
<tr>
<td>Metronidazole/Ciprofloxacin</td>
<td>500mg of each 2 times daily</td>
<td>8 days</td>
</tr>
</tbody>
</table>
Local administration of antimicrobial agents provides greater concentrations of drug directly to the infected area and reduces possible systemic side effects.
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>ANTIMICROBIAL AGENT</th>
<th>DOSAGE FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actisite</td>
<td>Tetracycline (0.5mm diameter fiber containing 12.7mg/9 inches)</td>
<td>Non resorbable fiber</td>
</tr>
<tr>
<td>Atridox</td>
<td>Doxycycline (10% doxycycline in gel system)</td>
<td>Biodegradable mixture in syringe</td>
</tr>
<tr>
<td>Dentamycin, Periocline</td>
<td>Minocycline (subgingival delivery system of 2%[w/w] minocycline hydrochloride)</td>
<td>Biodegradable mixture in syringe</td>
</tr>
<tr>
<td>Elyzol</td>
<td>Metronidazole (25% gel)</td>
<td>Biodegradable mixture in syringe</td>
</tr>
<tr>
<td>PerioChip</td>
<td>Chlorhexidine (2.5mg chlorhexidine gluconate per chip)</td>
<td>Biodegradable device</td>
</tr>
</tbody>
</table>
Placement of Actisite fiber

Placement of Atridox gel
Minocycline syringable gel
SURGICAL TREATMENT

When the pockets are very deep, procedures must be performed so that all infection, plaque and calculus may be removed. Sometimes the bone around is no longer smooth and it must be corrected. There are times that bone may be actually added to areas where it has eroded away.

The various techniques for pocket depth reduction are:

1. GINGIVECTOMY

INDICATIONS
1. Elimination of suprabony pockets regardless of their depth, if the pocket wall is fibrous and firm.
2. Elimination of gingival enlargements.
3. Elimination of suprabony periodontal abscesses.

**TYPES**

a. Surgical gingivectomy
b. Gingivectomy by electrosurgery
c. Laser gingivectomy
d. Gingivectomy by chemosurgery

2. **THE MODIFIED WIDMAN FLAP**

**INDICATIONS**

1. For exposing the root surfaces for meticulous instrumentation.
2. For removal of the pocket lining.
3. THE UNDISPLACED FLAP

INDICATIONS
1. For access to root surface for meticulous instrumentation.
2. Removal of whole of pocket wall in the presence of sufficient amount of attached gingiva.

4. THE PALATAL FLAP

INDICATIONS
An apically positioned flap approach cannot be employed in mucogingival-osseous surgery involving the palate because no alveolar mucosa is present on the palate to permit apical positioning. Instead pocket elimination is achieved by designing a palatal flap that just covers the contours of the bone created by osseous recontouring to eliminate osseous defects.
5. THE APICALLY DISPLACED FLAP

INDICATIONS

1. Pocket eradication.
2. Widening the zone of attached gingiva.
3. Increase access to root surface for meticulous instrumentation.

6. FLAPS FOR REGENERATIVE SURGERY

- The papilla preservation flap
- Conventional flap for regenerative surgery
Locations of the internal bevel incisions for the different types of flaps.

Scallopings required for the different types of flaps.
A. Perio probe indicates excessive pocket depth.

B. Laser light removes bacteria and diseased tissue. Lasers used most commonly are CO2 and Nd:YAG (neodymium yttrium aluminum garnet) which have wavelengths of 10600 nm and 1064 nm respectively.

C. Ultrasonic scaler and special hand instruments are used to remove root surface tarter.

D. Laser finishes cleaning pocket and aids in sealing the pocket closed so new germs cannot enter.

E. Healing of gums to clean root surface occurs.

F. Bite trauma is adjusted.

G. Healing occurs.
PERIODONTAL ABCESS

It is a localized purulent inflammation in periodontal tissues. Also called lateral abcess or parietal abcess.

ETIOLOGY

1. Extension of infection from a periodontal pocket into the supporting periodontal tissues and there is localization of the supparative inflammatory process along the lateral aspect of the root.

2. Lateral extension of inflammation from inner surface of periodontal pocket into connective tissue of pocket wall.

3. Formation of abcess in pocket with a tortuous course (i.e. a spiral course).
4. Incomplete removal of calculus during periodontal treatment. The gingival wall occluding the pocket orifice and periodontal abscess occurs in the sealed area of the pocket.

5. After trauma to the tooth with perforation of the lateral wall of root in endodontic therapy.
MICROSCOPIC APPEARANCE

1. An abcess is a localized accumulation of viable and non viable PMNs within the periodontal pocket wall. The PMNs liberate enzymes that digest cells and other tissues to form pus. An acute inflammatory reaction surrounds the purulent area and the overlying epithelium exhibits intracellular and extracellular edema and invasion of leukocytes.

2. Localized acute abcess becomes a chronic abcess when its purulent content drains through fistula into the outer gingival surface or into the periodontal pocket.
3. Bacteria associated with abscess are gram negative anaerobic rods, cocci, fusiforms and spirochetes.

\[
\text{LOSS OF ATTACHMENT} = \text{POCKET DEPTH} - (\text{GINGIVAL MARGIN TO CEJ})
\]

TREATMENT OF PERIODONTAL ABCESS

1. ACUTE ABCESS
   
   Can be either treated by draining through pocket or by giving an external incision.

   DRAINING THROUGH POCKET
   
   Peripheral area around the abscess is anesthetized with LA (gel). Retract the pocket wall gently with periodontal probe or curette to initiate drainage.
through pocket entrance.

Gentle digital pressure and irrigation is used to clear the pocket.

Prescribe antibiotics like amoxicillin 1gm loading dose followed by 500mg 3 times a day for 3 days.

Then re-evaluate patient after 3 days.

If patient is allergic to penicillin, clindamycin 600mg loading dose followed by 300mg 4 times a day for 3 days.
DRAINAGE THROUGH EXTERNAL INCISION

Mainly done in more acute conditions.

1. Topical LA followed by injectable LA is injected into periphery of the lesion.

2. A vertical incision is made through most fluctuant centre of the abscess using 15 number BP blade.

3. The tissue lateral to the incision can be separated with a curette or a periosteal elevator.

4. Fluctuant matter is expressed and wound edges are approximated using gauze.
5. Systemic antibiotics are prescribed as above and post operative instructions are given -:

- Warm saline rinses 3-4 times a day.
- Chlorhexidine gluconate mouthwash twice a day.
- Decreased intake of fluids.
- Analgesics are prescribed for patient comfort.
2. CHRONIC ABCESS

1. Curette the contents of the pocket by scaling and root planing.

2. Surgical treatment is done when deep vertical or furcation defects are present.

3. Antibiotics are prescribed as above.
PERIODONTAL CYST

It is an uncommon lesion that produces localized destruction of the periodontal tissues along a lateral root surface, most often in the mandibular canine-premolar area.

ETIOLOGY

1. Odontogenic cyst caused by proliferation of the epithelial rests of malassez.

2. Lateral dentigerous cyst retained in the jaw after tooth eruption
3. Primordial cyst of supernumerary tooth germ.

4. Stimulation of epithelial rests of the periodontal ligament by infection from a periodontal abscess or the pulp through an accessory root canal.

A periodontal cyst is usually asymptomatic but it may be present as a localized tender swelling. Radiographically, an interproximal periodontal cyst appears on the side of the root as a radiolucent area bordered by a radiopaque line.
Microscopically, the cystic lining may be
1. A loosely arranged, nonkeratinized, thickened, proliferating epithelium.
2. An odontogenic keratocyst.

Lined by extremely thin epithelium:
  one or two layers thick
what type of defects are found in infrabony pocket?

a) Vertical defect  
b) Horizontal defects  
c) a and b  
d) None of above

Periodontal pus is a

a) primary sign  
b) Secondary sign  
c) Both of the above  
d) None of the above

Relative volume of PMN during pocket formation reaches upto

a) 40%  
b) 50%  
c) 60%  
d) 70%
Periodontal pocket is?

a) Physiological deeping of gingival sulcus
b) Pathological deeping of gingival sulcus
c) a and b
d) None of above

The contents of periodontal pocket includes

a) Microbial colonies and their products
b) Gingival crevicular fluid
c) Desquamative epithelial cells
d) All of the above

Periodontal pocket is a

a) Healing lesion
b) Destructive lesion
c) Regenerative lesion
d) None of the above
Bleeding on probing result from
a) Increased vascularity
b) Thinning of epithelium
c) Proximity of the engorged blood vessels
d) All of the above

During periodontal pocket formation there is migration of
a) junctional epithelium
b) Gingival margin
c) Gingival sulcus
d) None of the above