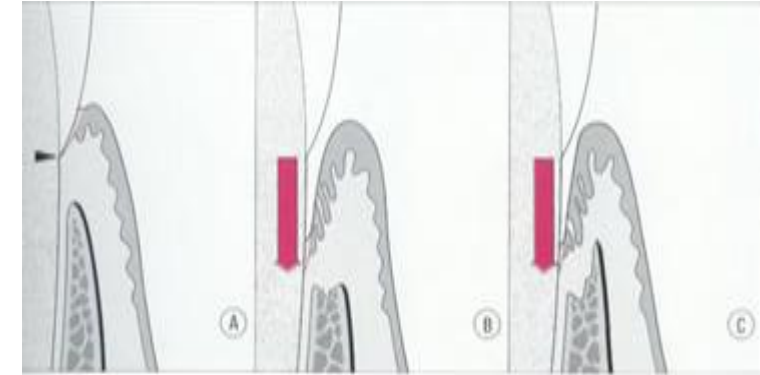


Pathogenesis of periodontal disease

- Accumulation of microorganisms on the supragingival tooth surface and its extension into gingival sulcus
- Inflammatory changes in the connective tissue wall of the gingival sulcus
- Cellular and fluid inflammatory exudate causes degeneration of the connective tissue including the gingival fibres
- Collagen fibres gets destroyed apical to the junctional epithelium and the area becomes occupied by the inflammatory cells and edema
- The coronal portion of the junctional epithelium detaches from the root as the apical portion migrates
- Polymorphonuclear neutrophils invade the coronal end of the junctional epithelium become increased in number
- With continued inflammation the gingiva increase in bulk and the crest of the gingival margin extends coronally
- The junctional epithelium continues to migrate along the root and separate from the root



Mechanisms of the collagen loss

There are two mechanisms involved

- **First mechanism:** collagenases and other enzymes secreted by fibroblast, PMNs and macrophages. These enzymes degrade the collagen and other matrix macromolecules into small peptides which are called as matrix metalloproteinase

- **Second mechanism**

Fibroblast phagocytizes collagen fibres by extending cytoplasmic processes to the ligament-cementum interface and degrade the inserted collagen fibrils and the fibrils of cementum matrix

Histopathology

A. Epithelial changes

- Epithelium becomes degenerated and atrophied
- Inner aspect of the pocket wall becomes ulcerated
- Pus occurs in the pocket with suppurative inflammation of the inner wall

B. Connective tissue changes

- The connective tissue is edematous and densely infiltrated with plasma cells, lymphocytes and PMNs
- Blood vessels increased in number, dilated and engorged in subepithelial connective tissue layer
- Single or multiple necrotic foci are presented in the connective tissue
- Proliferation of endothelial cells, with newly formed capillaries, fibroblasts and collagen fibres

C. Root surface wall of the pocket

- Root surface forms the medial wall of the pocket
- The root surface that get exposed to the oral environment as a result of periodontal attachment loss undergo **Structural, chemical and cytological changes**

Structural changes

- Exposure of cementum to the oral environment
- Minerals (Ca, F,...) present in saliva tend to get deposited on the cementum surface
- An area of hypermineralisation
- Root surface is exposed to oral fluids and bacterial plaque
- Proteolysis of embedded remnants of Sharpey's fibres
- Area of demineralisation
- Root caries yellowish or brown patch

- Soft and lethargy on probing
- Patient feels hypersensitivity to thermal changes and sweets
- Pulp exposure may occur in sever forms

Chemical changes

- Cementum exposed to saliva may absorb calcium, phosphorus, magnesium and fluoride
- This increases in 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 or endotoxins in the cementum

Pocket probing

There are different pocket depths

1) Biological or histologic probing depth: distance between gingival margin and the base of the pocket

2) Clinical or probing depth: distance to which a probe penetrates into the pocket

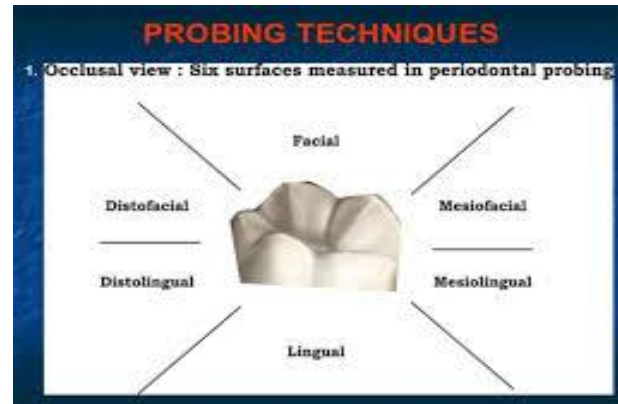
The standardized force used for penetration of probe is 25 pounds or 23 grams (0.75) N

Probing pocket depth PPD: distance between base of the pocket and gingival margin

The extent of disease refers to the proportion of the dentition affected by the disease in terms of percentage of sites

- Sites are defined as the positions at which probing measurements are taken around each tooth and generally six probing sites around each tooth are recorded as follows

- 1- Mesiobuccal
- 2- Mid-buccal
- 3- Distobuccal
- 4- mesiolingual
- 5- Mid-lingual
- 6- Distolingual



If up to 30% of sites in the mouth are affected, the manifestation is classified as localized for more than 30% the term generalised is used

Level of attachment loss (CAL): distance between base of pocket and a fixed point on the tooth such as CEJ

Severity

The severity of disease refers to the amount of periodontal ligament fibres that have been lost, termed clinical attachment loss

- According to the **American Academy of Periodontology** the classification of severity is as follows
- Mild: 1-2mm of attachment loss
- Moderate: 3-4mm of attachment loss
- Severe: \geq 5mm of attachment loss

Periodontal pocket 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

Edematous pocket walls: when the inflammatory component predominates, the lateral wall appears soft, edematous, friable, with smooth shiny surface and bluish red discoloration

Fibrotic pocket wall: when reparative changes predominates, the gingiva appears fibrotic and pink

In some cases both lesions present in the same pocket as outer surface of a pocket wall is fibrotic , the inner surface of soft tissue wall is inflamed and ulcerated

Clinical features

- A.
 - 1- Bluish red discoloration of the gingival wall of the pocket, this happened due to circulatory stagnation
 - 2- Fragility of tissue: due to destruction of gingival fibres
 - 3- Smooth shiny surface due to atrophy of the epithelium and edema
 - 4- Pitting on pressure due to edema and degeneration

- B. Gingival wall may be pink or firm, when fibrotic changes predominates over exudation and regeneration

- C. Bleeding on probing due to
 - 1- Increasing vascularity
 - 2- Thinning and degeneration of epithelium
 - 3- Proximity of engorged vessels to inner surface

4- Probing is generally painful due to ulceration of the inner aspect of the pocket wall

5- Pus may be present due to suppurative inflammation

6- Other clinical features

- Thickened marginal gingiva
- Loss of stippling
- Tooth mobility and diastema formation

Signs and symptoms

1. Total loss of attachment: clinical attachment loss (CAL) is the sum of **gingival recession** and **probing depth**

In early stages, periodontitis has very few symptoms, and in many individuals the disease has progressed significantly before patients are seeking treatment

Symptoms may include

- **Redness or bleeding** of gingiva while **brushing** teeth, using dental floss or biting into hard food (e.g. apples) (through this may occur even in gingivitis, where there is no attachment loss)
- **Gingival swelling** that recurs
- **Spitting out blood** after **brushing** of teeth
- **Halitosis** or **bad breath** and a **persistent metallic taste** in the mouth
- **Gingival recession** resulting in apparent **lengthening of teeth** (this may also be caused by heavy-handed brushing or with a stiff toothbrush)
- **Loose teeth**, in the later stages (though this may occur for other reasons as well)

Patients should realise gingival inflammation and bone destruction are largely painless

- Hence, people may wrongly assume painless bleeding after teeth cleaning is insignificant, although this may be a symptom of progressing periodontitis in that patient

Periodontal disease activity

1- Period of quiescence or inactivity this period characterised by reduced inflammatory response and little or no loss of bone and connective tissues

- A build up of dental plaque with G-ve followed by

2- Period of exacerbation (bone and connective tissue attachment loss and pocket)

This period may last for **days, weeks, months** and eventually followed by period of remissions and quiescence in which G+ve bacteria proliferate and more stable condition is established

- **Clinical features** shows spontaneous bleeding on probing and greater amount of gingival exudates
- **Histological features**, pocket appear thin and ulcerated, infiltrate composed of plasma cells and PMNs

Treatment

Non-surgical treatment

- 1) Oral hygiene **motivation** and **instruction**
- 2) Scaling and root planning
 - Using curettes for subgingival scaling, root planning and removal of the soft tissue lining pocket
 - Root planning stroke should be moderate to light
 - Pull stroke for final smoothing and planning of root surface
 - Continuous series of long overlapping shaving stroke should be achieved
 - To avoid over instrumentation, a delicate transition from short, powerful scaling stroke to longer, lighter root planning strokes must be made as soon as calculus and initial roughness have been eliminated

Surgical treatment

Surgical depth reduction through different surgical procedures

- 1- Gingival curettage
- 2- Gingivectomy
- 3- Periodontal flap procedures
- 4- Osseous surgery
- 5- Periodontal regeneration procedures