Lec. 1

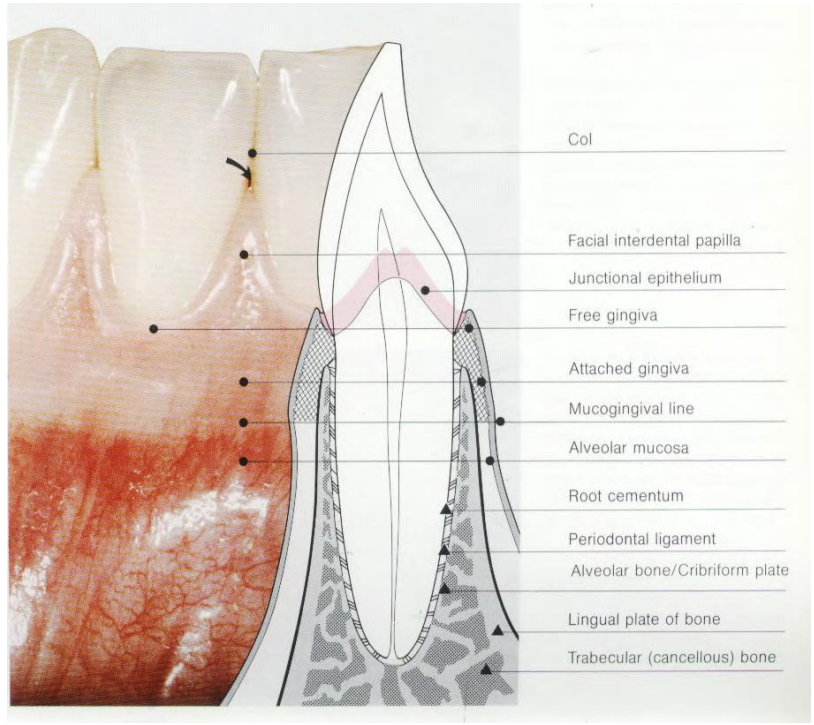
د.نهى عكاب

What is Periodontology?????

The clinical science that deals with teeth and their supporting structures (periodotnium) in health and disease conditions.

Periodontium: is the tissue that surround and support teeth. It composed of :

1. Periodontal ligament (PDL).
2. Gingiva.
3. Cementum
4. Alveolar bone



Periodontics: is the branch of dentistry that specified to treat and prevent periodontal disease.

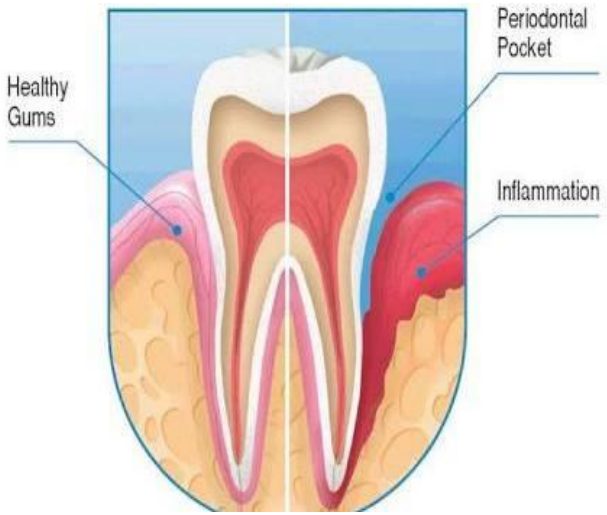
Periodontal disease: the pathological process involved the periodontium leading to gingivitis and periodontitis.

Gingivitis: a reversible inflammation of the gingiva, without loss of attachment of PDL, usually associated with erythema (redness), swelling and bleeding on probing.

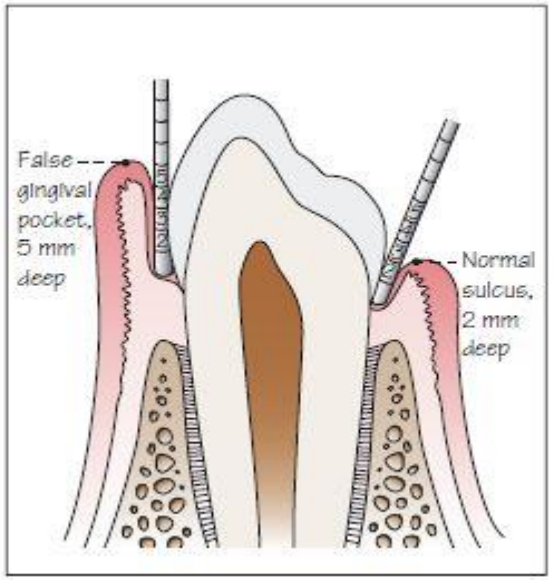


Periodontitis: Inflammation of the tooth supporting tissues, resulting in permanent destruction of the periodontium.


True periodontal pocket: a pathological migration of junctional epithelium from the cementoenamel junction causing deepened gingival sulcus due to loss of connective tissue attachment as a result of a progressing of periodontal disease



Pseudo pocket (false pocket): deepening in gingival sulcus due to gingival enlargement by certain pathological conditions, without migration of junctional epithelium or destruction of periodontal tissues.



Periodontal ligament (PDL): connective tissue connect the root to the alveolar bone.
It consists of:

1. Bundles of intermingling collagen fibres.
2. Cellular elements.
3. Ground substance.

It is worth mention that PDL and cementum develop from the follicular sac, derived from mesenchyme. PDL development occur during root formation and tooth eruption.

Components of PDL fibres:

A. Principal fibres: comprise the majority of PDL, consisting of collagen fibres, arranged in bundles in an S-shaped course.

-The development of principal fibres has been noticed as small, fine and brush like fibrils detected arising from the root cementum, projecting into the PDL side.

-At this stage, alveolar bone surface was covered by osteoblasts, with small number of radiating thin collagen fibrils.

-The number and thickness of fibres entering the bone increase and gradually become longer, whereas the fibres originating from the cementum are still short.

-These fibres are seen increased in length and thickness and fused with the that originated from the alveolar bone.

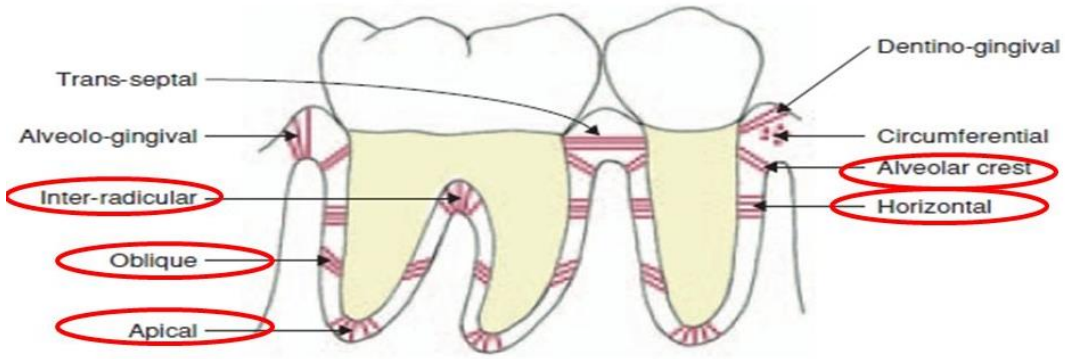
-Following tooth eruption, the principal fibres become organised in bundles, continuously connecting the root cementum to the alveolar bone. However, the tooth underwent active eruption thought to consist of two separated parts; one is located towards the cementum and the other towards the alveolar bone and connect together at the mid way through intermediate plexus.

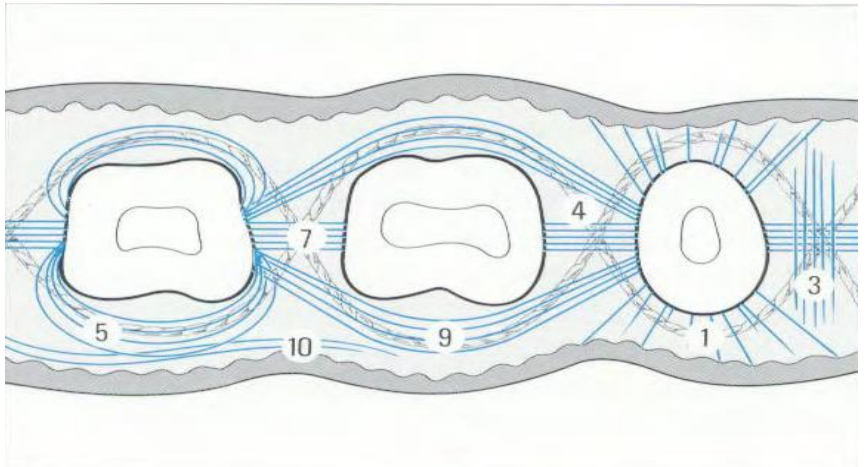
- Sharpy's fibres are the part of principal fibres that insert into the cementum from one side and the alveolar bone from the other side.

Principal fibres are arranged in five groups:

1- Alveolar crest fibres (ACF): obliquely extend from the root cementum to the crest of alveolar bone in an apical direction. ACF prevent the extrusion of the tooth and resist lateral tooth movements.

2- Horizontal fibers (HF): extend in a right angle to the long axis of the tooth, running from the cementum to the alveolar bone.
3- Oblique fibers (OF): are the largest group in the PDL, extending obliquely from the cementum in coronal direction to the alveolar bone. Its function is to withstand the masticatory force.
4- Apical fibers (AF): radiate from the cementum to the alveolar bone at the apical region of the tooth.
5- Inter-radicular fibers (IF): connect the cementum to the alveolar bone at the furcation area of multirooted tooth.





B. Elastic fibers: are associated with blood vessels and are relatively few.
C. Oxytalan fibers: are immature forms of fibers which may regulate vascular flow.

PDL include different cells:

1.Synthetic cells

Stem cells
Responsible for formation of osteoblasts, fibroblasts and all other type of cells

Osteoblasts
responsible for alveolar bone formation

Fibroblasts
the main components of PDL, which produce various types of fibers such as collagen, oxytalan and elastic fibers

Cementoblasts
- Responsible for cementum deposition
- Lining the cementum surface

2. Resorptive cells

- **Osteoclast**: large multinucleated cell, responsible for bone resorption
- **Cementoclasts**: Although cementum is not remodelled as alveolar bone, that may occur in certain conditions
- **Fibroblasts**: Has the capacity to phagocyte old collagen fibers by hydrolytic enzymes during normal turn over or disease

3. Epithelial rests of malassez: are found close to the cementum, which are reminants of hertwig root sheath. They proliferate in response to a stimuli and participate in formation of periapical and lateral root cysts.

4. Immune system cells: Neutrophils, Mast cells (contain histamine which play an important role in inflammatory process), macrophages (phagocytosis) and lymphocytes.

5. Cells associated with neurovascular elements

Ground substance of PDL:

Fills the PDL space between cells, fibers, blood vessels and nerves.
Containing 70% of water
The main 2 components of it are:

1. Glycosaminoglycans
2. Glycoproteins

PDL width:

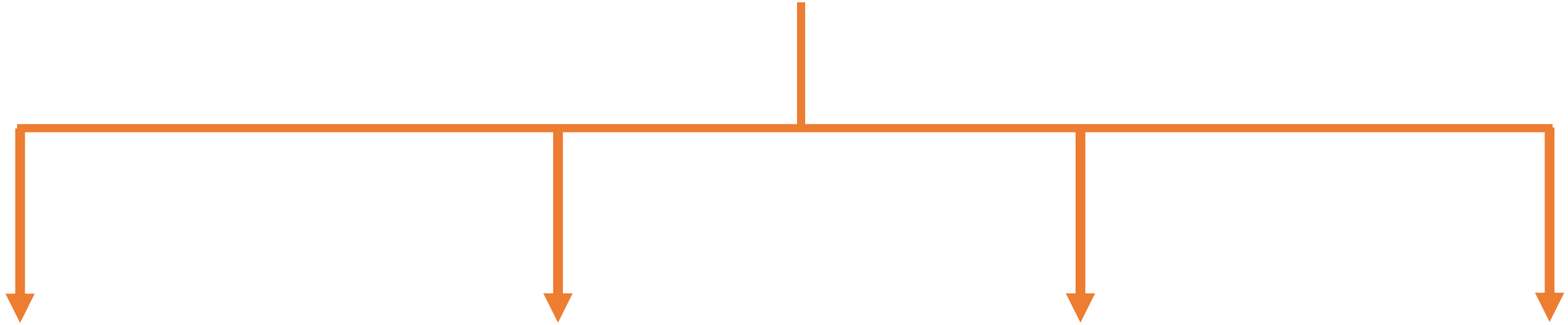
The width of PDL space varies in respect to age, location of tooth and the degree of stress to which the tooth is subjected.
-It found thinner on the mesial root surface than the distal.
- Hyperfunctional tooth my have wider PDL space.
- Normal PDL width is 0.25mm in normal function.
- Widest PDL space at cervical and apical parts, whereas narrowest at the middle.

PDL elasticity:

It comes from:

1. The wavy course of the principle fibers, which allows for a slight movement of teeth.
2. Intermediate plexus
3. The presence of oxytalan and elastic fibers, although they are relatively few.

PDL functions



Physical

-Attachment of teeth to the bone
-Transmission of occlusal force to the bone
-Resistance to the occlusal impact forces
-Protect the vessels and nerves from mechanical force injury

Formative and remodelling

-Formation and resorptivion of bone and cementum
-Break down and replace the old cells and fibres

Nutritive

-By blood vessels, which supply bone, gingiva and cementum
-Provide lymphatic drainage

Sensation

-Provide sensation, tactile, pressure and pain
-Provide mechanoreceptors, transmit sense of localisation unlike the pulp (no sense of localisation)

Blood supply of PDL

It derived from inferior and superior alveolar arteries of mandible and maxilla respectively, reach the PDL from three sources;

1. Apical vessels supply the apical region of the PDL.
2. The transalveolar vessels through alveolar bone
3. Anastomosing vessels from the gingiva