Viva Voce in

PERIODONTICS



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Forewords
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JAYPEE

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Chapter 1

Normal Periodontium

T Siji Jacob, P Arunmozhi

1. What is gingiva?

Gingiva is a part of the oral mucosa that covers the alveolar processes of the jaws and surrounds the cervical portion of the teeth.

2. How is the gingiva divided anatomically?

The gingiva is divided into marginal, attached, interdental areas.

3. What is marginal gingiva?

The marginal gingiva, unattached gingiva or free gingiva is the border of the gingiva surrounding the teeth in a collar like fashion. It is about 1 mm wide and form the soft tissue wall of the gingival sulcus.

4. What is gingival sulcus?

The gingival sulcus is a "V" shaped space around the tooth bounded by the surface of the tooth on one side and the marginal gingiva on the other.

5. What is the normal depth of the gingival sulcus?

The normal depth of the gingival sulcus is

In histologic section → 0 to 6 mm
Clinically → 2 to 3 mm

6. What is attached gingiva?

The attached gingiva is firm, resilient and tightly adapted to the underlying periosteum of alveolar bone. This is continuous with the marginal gingiva and extends upto the alveolar mucosa.

7. What is the width of the attached gingiva?

This is the distance between the mucogingival junction and the base of the gingival sulcus or the periodontal pocket.

8. What is the width of the attached gingiva in different areas of the mouth?

Incisor region → 3.5 to 4.5 mm in maxilla where 3.3 to 3.9 mm in mandible
Premolar region → (It is the least) 1.9 mm in maxilla 1.8 mm in mandible

9. What is interdental gingiva?

Interdental gingiva is that part of the gingiva which is present in the interproximal space beneath the area of tooth contact.

10. What are the two different forms of interdental gingiva?

a. Pyramidal → Tip of one papilla is located beneath the contact point
b. "Col" shaped → "Concave" shaped depression that connects the facial and lingual papilla

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11. What are the factors that govern the shape of the interdental gingiva?

A. Contact point between two adjoining teeth
B. Presence or absence of recession
C. Width of the approximal tooth surface
D. Course of CE junction

12. How do you classify the gingival epithelium based on the morphology and function?

A. Oral or outer epithelium which faces the oral cavity
B. Oral sulcular epithelium which faces the tooth without being in contact with the tooth surface
C. Junctional epithelium provides the contact between the gingiva and the tooth.

13. What is the principal cell type in the gingival epithelium?

The principal cell type is the keratinocytes.

14. What are clear cells or nonkeratinocytes?

Langerhans' cells
Have g-specific granules (Birbeck's granules found in the suprabasal area and play a role in defense mechanism of the oral mucosa
Merkel cells: Play a role in the sensory function and is found in deep layer of the epithelium.
Melanocytes: Synthesis melanin and found in the basal and spinous layer of the of the epithelium.

15. What are the functions of gingival epithelium?

A. Protects the deep structures
B. Allowing a selective interchange with the oral environment
C. Signaling function

16. What are the names of proteins synthesized by the gingival epithelium?

A. Keratins
B. Keratolinin
C. Involucrin

17. What are desmosomes and hemidesmosomes?

The cell membrane of the epithelial cells facing the lamina lucida, harbors a number of electron-dense, thicker zones appearing at various intervals along the cell membrane. These structures are called hemidesmosomes.

A demosome is made up of two hemidesmosomes facing one another. Separated by a zone containing electron dense granulated material.

18. What are odland bodies or keratinosomes?

These are modified lysosomes containing large amounts of acid phosphatase and found in the uppermost cells of the stratum spinosum.

19. What are the different cell layers found in the oral epithelium?

Oral epithelium is a keratinized, stratified, squamous epithelium and is differentiated into different cell layer based on the keratin—producing cells.

A. Basal layer (Stratum basale or Stratum germinativum)
B. Prickle cell layer (Stratum spinosum)
C. Granular cell layer (Stratum granulosum)
D. Keratinized cell layer (Stratum corneum)

20. What is orthokeratinized epithelium?

The cells of the Stratum corneum of the gingiva contain no cell nuceli, the epithelium is called orthokeratinized.

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21. What is parakeratinized epithelium?

The cells of the stratum corneum of the gingiva contain remnants of the nuclei (Pyknotic), the epithelium is called parakeratinized.

22. What is nonkeratinized epithelium?

The epithelium has neither granulosum nor corneum strata, whereas superficial cells have viable nuclei.

23. What is meant by basal lamina?

The epithelium and connective tissue is connected by a 300 to 400° A thick basal lamina which consist of lamina lucida and lamina densa. The lamina lucida is made up of glycoprotein laminin and the lamina densa in made up of type IV collagen.

24. What is oral or outer epithelium?

This is a keratinized or parakeratinized epithelium found over the crest and outer surface of the marginal gingival and attached gingiva.

25. What are the keratins found in the outer epithelium?

K_1, K_2, and $K_{10,12}$ in orthokeratinized area and less in parakeratinized area.

K_{19} is found in parakeratinized area and less in orthokeratinized areas.

26. What is sulcular epithelium?

It is thin, nonkeratinized stratified squamous epithelium without retepegs and extends from the crest of gingival margin to the junctional epithelium.

27. What is the function of sulcular epithelium?

The epithelium acts as a semipermeable membrane by which injurious bacterial products pass into the gingiva and tissue fluid seeps from the gingiva into the sulcus.

28. When does the sulcular epithelium a nonkeratinized tissue show keratinization?

A. When it is exposed to the oral cavity

B. Bacterial flora of the sulcus is fully eliminated.

29. What is junctional epithelium and its normal length?

Junctional epithelium is a collar like band of stratified squamous non-keratinizing epithelium. The length of junctional epithelium ranges from 0.25 to 1.35 mm.

30. What are the parts of junctional epithelium?

Junctional epithelium is attached to the tooth surface by an internal basal lamina and to the gingival connective tissue by an external basal lamina. The internal lamina is further divided into lamina densa (adjacent to the enamel and lamina lucida in which the hemidesmosomes are attached).

31. What is dentogingival unit?

Junctional epithelium plus gingival fibers which form a functional unit is called dentogingival unit.

32. What are the ways by which junctional epithelium contribute to preventing pathogenic bacterial flora from colonizing the subgingival tooth surface?

A. Junctional epithelium firmly attached to the tooth surface, forming an epithelial barrier against plaque bacteria.

B. It allows access of GCF (Inflammatory cells, components of the immunologic host defenses to the gingival margin.

C. Junctional epithelium exhibit epithelial cells with rapid turn over, which contribute to the host parasite equilibrium and rapid repair of damaged tissues.

D. Some studies have shown junctional epithelium cells showing endocytic

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capacity equal to that of macrophages and neutrophils which might be protective in nature.

33. What are acquired and developmental coatings of the teeth?

A. Acquired coating → exogenous (e.g.) saliva, bacteria, calculus and surface stains

B. Developmental coating → Part of tooth development:– Reduced enamel epithelium, coronal cementum and dental cuticle

34. Functions of GCF

A. Cleanse the sulcus
B. Has plasma proteins that may improve adhesion of the epithelium to the tooth
C. Has antimicrobial properties
D. Exerts antibody activity

35. What is the ground substance of the gingival connective tissue made up of?

The ground substance fills the spaces between the fibers and cell, is amorphous and has high content of water. It is composed mainly of proteoglycans (glycosoaminoglycans) and glycoproteins.

36. What is lamina propria and what are its layers?

The gingival connective tissue is called the lamina propria. This has 2 layers:

A. Papillary layer → Consisting of papillary projections between the epithelium retepegs adjacent to the epithelium

B. Reticular layer → Is continuous with the periosteum of the alveolar bone.

37. Names of the three types of connective tissue fibers?

A. Collagen → Type I is the major form and provides tensile strength to the gingival tissue

B. Reticular → Type IV (argyrophilic reticular fiber). Continuous with fibers of the basement and blood vessel wall

C. Elastic → Composed of oxytalan, elaunin and elastin fibers found among collagen fibers

38. What are gingival fibers?

The gingival connective tissue is made up of collagen fiber bundles called gingival fibers.

39. What are the functions of the gingival fibers?

A. Helps to attach the marginal gingiva firmly against the tooth
B. Gives rigidity to withstand masticatory forces
C. Attaches the free marginal gingiva with the cementum of the root and the adjacent attached gingiva.

40. What are the names of gingival fibers?

Gingival fibers are classified as principal group fibers made up of five bundles.

A. Gingivodental gingival fibers
B. Circular fibers
C. Transseptal gingival fibers → This fiber is sometimes classified under periodontal ligament fibers
D. Alveolar gingival fibers
E. Dentoperiosteal fibers

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Secondary group of minor fibers of six sets

A. Periosteal gingival fibers
B. Transgingival fibers
C. Intercircular fibers
D. Intergingival fibers
E. Semicircular fibers
F. Oxytalan fibers
G. Elastin fibers

41. What are the names of cellular elements in the gingival connective tissue?

A. Fibroblast → Synthesis collagen, elastic fibers, glycoproteins, glycosoaminoglycans and amorphous intercellular substance regulate collagen degradation
B. Mast cells, fixed macrophages, histocyte, adipose cells and eosinophils
C. Neutrophils and small foci of plasma cells

42. What is active eruption?

Movement of the teeth in the direction of the occlusal plane.

43. What is passive eruption?

Apical migration of the gingiva with exposure of the teeth.

44. What are the sources of blood supply to the gingiva?

Three sources of blood supply to the gingiva:
1. Supraperiosteal arterioles
2. Vessels of the periodontal ligament
3. Arterioles — emerge from the crest of the interdental septa.

45. Where does the gingiva gets its nerve supply from?

The regions of the gingiva are innervated by the end branches of the trigeminal nerve. (fibers arising from nerves in the periodontal ligament and from the labial, buccal and palatal nerves.

46. What are nerve structures found in the connective tissue?

A. Meshwork of terminal argyrophilic fibers
B. Meissner type tactile corpuscles
C. Krause types end bulb
D. Encapsulated spindles

47. What is the normal size of gingiva?

The size of gingiva corresponds to the sum total of cellular and intercellular elements and their vascular supply.

48. What are the distinct difference between the oral sulcular epithelium, the oral epithelium and junctional epithelium?

A. The size of cells in functional epithelium is relative to the tissue volumes, i.e. larger than in the oral epithelium.
B. The intercellular space in junctional epithelium is relative to the tissue volume, i.e. wider comparatively than in the oral epithelium.
C. The number of desmosomes is smaller in junction epithelium than in the oral epithelium.

49. What is the oxygen consumption of the gingiva?

The oxygen consumption of the normal gingiva QO^2 1.6; ± 0.37 is comparable with that of skin QO^2 1.48 ± 0.48. The respiratory activity of the epithelium is approximately three times greater than that of the connective tissue and that of the sulcular epithelium is approximately twice that of the whole gingiva.

50. What is pristine gingiva?

Histologically perfect gingiva is called as pristine gingiva.

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51. What is the histochemical aspect of normal gingiva?

Alkaline phosphatase	Found in the endothelial cells, in capillary walls and fibers of the connective tissue. Seen in parakeratinized and keratinized layer
Acid phosphatase	Found in great concentration in the epithelium and related to keratinization not seen in junctional epithelium and sulcus lining
Diphospho and triphospho pyridine nucleotide reductases	Present in epithelial cells except keratin, parakeratin, desmosomes, tonofibrils, and nucleoli
Acetylcholinesterase and non specific cholinesterase	Are present in gingival connective tissue
Esterase	Basal and granular layers of the epithelium and in connective tissue near periodontal pockets
Collagenase	Is produced in epithelium, connective tissue of normal gingiva, bone and periodontal ligament
Cytochrome oxidase	Occurs in sulcular and junctional epithelium in the basal layers of marginal and attached gingiva and in connective tissue
5-nucleotidase	Blood vessels and surface epithelium cells of keratinized gingiva and in the blood vessels of nonkeratinized and parakeratinized gingiva

52. What are the other enzymes found in the gingiva?

Endogenous reducing enzymes, succinic dehydrogenase, lactic dehydrogenase, glucose-6-phosphate dehydrogenase, beta-D-glucuronidase, beta-glucosidase, beta-galactosidase and aminopeptidase.

53. Ratio of melanocytes to keratin producing cells in gingiva

1: 36 cells.

54. What is the name of tooth supporting structure?

They are periodontal ligament, alveolar bone and cementum.

55. What type of collagen fibers are present in the periodontal ligament fibers? What are they otherwise called?

They are called the principal fibers and are predominantly made up of type I collagen.

56. What is the name of periodontal ligament fibers?

They are present as six groups they are:

A. Transseptal group **B.** Alveolar crest group
C. Horizontal group **D.** Oblique group
E. Apical group **F.** Interradicular group

57. Which group of fibers prevents extrusion and lateral tooth movement?

Alveolar crest group.

58. Which is the largest group of periodontal ligament fibers and what is its function?

The largest group of periodontal ligament fiber is the oblique group and their function is to withstand vertical masticatory stress.

59. Names of two immature forms of elastin present in periodontal ligament?

The two immature forms of elastins are α-oxytalan and elaunin, they are called oxytalan fibers.

60. What are the indifferent fiber plexus?

Along with the principal collagen fibers, small collagen fibers are also present and they form a plexus called indifferent fiber plexus.

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61. What is periodontal ligament?

Periodontal ligament is a soft, rich, vascular cellular connective tissue that surrounds the roots of the teeth and connects the tooth to the bone. It is hour glass shaped.

62. What are the principal cells found in the periodontal ligament?

A. Connective tissue cells → Fibroblasts, cementoblasts and osteoblasts
B. Epithelial rests of Malassez → Remnants of Hertwig's root sheath
C. Immune cells → Neutrophils, lymphocytes, macrophages, mast cells and eosionophils
D. Cells associated with neurovascular elements

63. Names of components of the periodontal ligament ground substance

A. Glycosaminoglycans → Hyaluronic acid and Proteoglycans
B. Glycoproteins → Fibronectin and laminin
C. Water → 70%

64. What are cementicles and what are its effects?

Cementicles are calcified masses found in periodontal ligament. They are caused by calcification of epithelial rests, Sharpey's fibers, or thrombosed vessels.

65. What are Sharpey's fibers?

The terminal portion of the principal fibers that are present in the cementum and bone are called as Sharpey's fibers.

66. What are the functions of periodontal ligament?

The main functions are physical, formative and remodeling, nutritional and sensory.

67. What are the primary physical functions?

A. Protects the vessels and nerves from injury
B. Transmitting the occlusal forces to the bones
C. Attachment of the teeth to the bone
D. Shock absorption
E. Maintaining the proper relationship of the gingival tissue to the teeth.

68. What are the four types of neural termination found in the periodontal ligament?

A. Free endings → Carry pain sensation
B. Ruffini like → Found in the apical mechanoreceptors region
C. Messiner's corpuscles → Mechanoreceptors found in the mid root region
D. Spindle like → Pressure and vibration

69. What are the causes for widening of PDL space ?

Local causes

- Periodontitis
- Infection/inflammation
- Odontogenic tumors
- Iatrogenic – orthodontic forces
- Trauma from occlusion
- Dental concussion
- Traumatic injury
- Attrition

Systemic causes

- Paget's disease
- Scleroderma
- Hypophosphatasia
- Hypoparathyroidism
- Osteomyelitis
- Metastatic carcinoma
- Leukemia
- Bone pathology

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70. What are the causes for thinning PDL space?

A. Teeth in infra occlusion
B. Trauma — intruded teeth
C. Embedded teeth
D. Physiological ageing

71. Where is generalized widening of periodontal ligament space seen?

Scleroderma.

72. What is cementum?

Cementum is an avascular specialized mineralized tissue that covers the anatomic root.

73. How is cementum classified?

Cementum is classified into acellular (primary) and cellular (secondary) cementum.

74. What is acellular cementum?

This type of cementum doesn't contain cells and it is found approximately in the cervical third or 1/2 of the root. It is the first formed cementum and so called as primary cementum. The primary constituent of this cementum is Sharpey's fibers.

75. What is cellular cementum?

Cellular cementum contains (cementocytes) cells in individual spaces called (lacunae). They are formed only after the tooth reaches the occlusal plane and is called as secondary cementum. Sharpey's fibers occupy only a small portion.

76. How has Schroeder classified cementum?

A. Schroeder has classified cementum into
B. Acellular afibrillar cementum (AAC)
C. Acellular extrinsic fiber cementum (AEFC)
D. Cellular mixed stratified cementum (CMSC)
E. Cellular intrinsic fiber cementum (CIFC)
F. Intermediate cementum (IC)

77. Differences between acellular and cellular cementum

	Acellular cementum	*Cellular cementum*
A.	Forms during root formation	Forms after the eruption of the tooth and in response to functional demand
B.	Does not contain any cell	Cementocytes are present
C.	Seen at the coronal portion of the root	Seen at the apical portion of the root
D.	Deposition is slow	Deposition is rapid
E.	Collagen fibers are arranged in an organized manner	Collagen fibers are irregularly placed

78. What is meant by intermediate cementum or the hyaline layer of Hope-Well Smith?

The is a poorly defined zone near the cemento dentinal junction of certain teeth that contains cellular remnants of Hertwig's sheath embedded in calcified ground substance.

79. What are the different types of relationships involving the cementum at the cementoenamel Junction?

60 to 65 % cementum overlaps the enamel
30% end to end relationship (butt joint)
5 to 10% cementum and enamel fails to meet.

80. What is the thickness of the cementum?

The thickness of cementum increases three times between the age of 11 to 70 ages. The greatest thickness is found in the apical third, furcation and distal surfaces of teeth. At the coronal half the thickness varies from 16 to 60 μm (almost the thickness of hair). Apical third 150 to 200 μm.

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81. What is hypercementosis? What is its etiology?

Thickening of the cementum is called hypercementosis. The main cause of hypercementosis is orthodontic force and periapical irritation.

82. In which disease state is generalized hypercementosis present for the entire dentition?

Paget's disease.

83. What is the cause of cemental resorption?

The causes can be local or systemic.

Local causes

- Trauma from occlusion
- Orthodontic movement
- Pressure from malaligned teeth, cysts, tumors, embedded teeth
- Periapical and periodontal disease
- Replanted and transplanted teeth
- Teeth without functional antagonists

Systemic causes

- Calcium deficiency
- Hypothyroidism
- Hereditary fibrous osteodystrophy
- Paget's disease

84. What is ankylosis and its etiology?

Fusion of cementum and alveolar bone with obliteration of the periodontal ligament is called ankylosis.

Etiology

- Chronic periapical inflammation
- Tooth reimplantation
- Occlusal trauma
- Embedded teeth

85. What is alveolar bone?

Alveolar bone is the portion of the maxilla and mandible that supports the tooth socket (alveoli).

86. What are the parts of alveolar bone?

1. Cortical or external plate formed by haversian bone and compacted bone lamellae.
2. Compact bone which forms the inner socket wall or alveolar bone proper. This is seen as lamina dura in the radiographs. Histologically this is seen as a series of opening (cribiform plate) through which the neurovascular bundle of periodontal ligament links with the cancellous bone.
3. Cancellous trabecular found in between two compact bone layers.

87. What are the local and systemic influences on bone remodeling?

Local

A. Age related changes to the bone
B. Functional requirements on the tooth

Systemic (hormonal)

A. Parathyroid hormone (PTH)
B. Calcitonin estrogen
C. Vitamin D_3
D. Estrogen

88. What is bundle bone?

Bone adjacent to periodontal ligament that contain large amount of Sharpey's fibers is called bundle bone.

89. What is the normal distance between the CEJ and crest of alveolar bone?

The normal distance between the CEJ and crest of alveolar bone in young adults ranges from 0.75 to 1.49 mm. This distance increases with age.

90. What is the difference between fenestration and dehiscence

Fenestration	*Dehiscence*
Isolated areas in which the root is	Isolated areas in which the root is

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Fenestration	*Dehiscence*
denuded of bone and is covered by periosteum and overlying gingiva. Marginal bone is intact.	denuded of bone and is covered by periosteum and overlying gingiva. Marginal bone is involved.

They are seen commonly on the facial bone than on the lingual, bilaterally seen and common in the anterior region than in the posterior region.

91. What are the causes of fenestration and dehiscence?

Prominent root contours, malposition, Labial protrusion of the root with thin bony plate.

92. During the development of the periodontium which group of fibers are formed first?

The gingivodental fibers.

93. What is disuse or afunctional atrophy?

When occlusal forces are reduced the periodontal ligament appears thin, fibers are placed parallel to the root surface with the number and thickness of the trabeculae reduced this is called disuse atrophy.

94. What are the age changes in gingiva and other area of the oral mucosa?

A. Decreased keratinization
B. Decreased connective tissue cellularity
C. Decreased oxygen consumption
D. Increased width of attached gingiva
E. Increase in number of masts cells
F. Greater amount of intercellular substances
G. Atrophy of the connective tissue with loss of elasticity
H. Reduced or unchanged amount of stippling.

95. What are the age changes in the periodontal ligament?

A. Decreased vascularity
B. Decreased mitotic activity
C. Decreased fibroblasts
D. Collagen fibers and mucopolysaccharides are decreased
E. Increased elastic fibers and arteriosclerotic changes
F. Increase or decrease in the width the periodontal ligament
(Increase is a result of less number of teeth supporting the entire functional load. Decrease is associated with reduced strength of the masticatory musculature and continuous deposition of cementum and bone).

96. What are the age changes in alveolar bone and cementum?

A. Osteoporosis
B. Decrease vascularity
C. Reduction in metabolic rate and healing capacity
D. Resorption activity is increased and the rate of bone formation is decreased continuous deposition of cementum occurs with age and greater irregularity on the surface of both the cementum and alveolar bone facing the periodontal ligament is seen.

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