Chapter 12

The Gingiva

The true test of successful treatment, the real evaluation of the effects of scaling and related instrumentation, is the health of the periodontal tissues. The objective of all treatment is to bring the diseased periodontal tissues to a state of health that can be maintained by the patient. To do this, the first objective is to learn to recognize normal healthy tissue; to observe certain characteristics of color, texture, and form; to test for bleeding; and to apply this knowledge to the treatment and supervision of the patient’s gingiva until health is attained.

An outline of the clinical features of the periodontal tissues in health and disease is included in this chapter. Key words are defined in Box 12-1.

Box 12-1 Key Words

Key Words: Gingiva and Periodontium

Attachment apparatus: the cementum, periodontal ligament, and the alveolar bone.

Clinical attachment level: the probing depth measured from a fixed point, such as the cementoenamel junction.

Desmosome: cell junction; consists of a dense plate near the cell surface that relates to a similar structure on an adjacent cell, between which are thin layers of extracellular material.

Diastema: a space between two natural adjacent teeth. Plural, diastemata. See also Primate space, page 287.

Epithelium

Oral: the tissue serving as a liner for the intraoral mucosal surfaces.

Squamous: composed of a layer of flat, scalelike cells; or may be stratified.

Fibroblast: fiber-producing cell of the connective tissue; a flattened, irregularly branched cell with a large oval nucleus that is responsible in part for the production and remodeling of the extracellular matrix.

Fibrosis: a fibrous change of the mucous membrane, especially the gingiva, as a result of chronic inflammation; fibrotic gingiva may appear outwardly healthy, thus masking underlying disease.

Hemidesmosome: half of a desmosome that forms a site of attachment between junctional epithelial cells and the tooth surface.

Hyperkeratosis: abnormal thickening of the keratin layer (stratum corneum) of the epithelium.

Hyperplasia: abnormal increase in volume of a tissue or organ caused by formation and growth of new normal cells.

Hypertrophy: increase in size of tissue or organ caused by an increase in size of its constituent cells.

Keratinization: development of a horny layer of flattened epithelial cells containing keratin.

Marker: identifier; symptoms or signs by which a particular condition can be recognized; for example, clinical and microbiologic markers are used to identify gingival and
periodontal infections.

**Mastication**: act of chewing.

**Nonkeratinized mucosa**: lining mucosa in which the stratified squamous epithelial cells retain their nuclei and cytoplasm.

**Periodontium**: tissues surrounding and supporting the teeth; in two sections are the gingival unit, composed of the free and attached gingiva and the alveolar mucosa, and the attachment apparatus, which includes the cementum, periodontal ligament, and alveolar process.

**Probing depth**: the distance from the gingival margin to the location of the periodontal probe tip inserted for gentle probing at the attachment.

**Pus**: a fluid product of inflammation that contains leukocytes, degenerated tissue elements, tissue fluids, and microorganisms.

**Sharpey’s fibers**: penetrating connective tissue fibers by which the tooth is attached to the adjacent alveolar bone; the fiber bundles penetrate cementum on one side and alveolar bone on the other.

**Stippling**: the pitted, orange-peel appearance frequently seen on the surface of the attached gingiva.

**Suppuration**: formation of pus.

**Taste bud**: receptor of taste on tongue and oropharynx; goblet-shaped cells oriented at right angles to the surface of the epithelium.

### Objectives

The ultimate objective is to apply knowledge and skill in examination and assessment of the periodontal tissues to patient care so that each patient attains and maintains optimum oral health. The dental hygienist must know when the treatment provided by dental hygiene services is definitive in restoring health and when additional treatment is needed. The patient can be properly informed so that complete treatment can be provided.

Specific objectives are to be able to:

- Recognize normal periodontal tissues.
- Know the clinical features of the periodontal tissues that must be examined for a complete assessment.
- Recognize the markers that are the basic signs of periodontal infections and classify them by type and degree of severity.
- Identify the dental hygiene treatment and instruction needed.
- Outline the patient’s preventive program.

### The Treatment Area

The treatment procedures are applied directly to the teeth, the gingiva, and the gingival sulcus. Detailed knowledge and understanding of the anatomy and normal clinical appearance of the hard and soft oral tissues are prerequisite to meaningful examination and treatment.

#### 1. The Teeth
A. Clinical Crown
The part of the tooth above the attached periodontal tissues. It can be considered the part of the tooth where clinical treatment procedures are applied (Figure 12-1).

B. Clinical Root
The part of the tooth below the base of the gingival sulcus or periodontal pocket. It is the part of the root to which periodontal fibers are attached.

C. Anatomic Crown
The part of the tooth covered by enamel.

D. Anatomic Root
The part of the tooth covered by cementum.

II. Oral Mucosa
The lining of the oral cavity, the oral mucosa, is a mucous membrane composed of connective tissue covered with stratified squamous epithelium. There are three divisions or categories of oral mucosa.

A. Masticatory Mucosa

1. Covers the gingiva and the hard palate, the areas used most during the mastication of food.

2. Except for the free margin of the gingiva, the masticatory mucosa is firmly attached to underlying tissues.

3. The epithelial covering is generally keratinized.
B. Lining Mucosa

1. Covers the inner surfaces of the lips and cheeks, the floor of the mouth, the under side of the tongue, the soft palate, and the alveolar mucosa.

2. These tissues are not firmly attached to underlying tissue.

3. The epithelial covering is not generally keratinized.

C. Specialized Mucosa

1. Covers the dorsum (upper surface) of the tongue. It is composed of many papillae; some contain taste buds.

2. The distribution of the four types of papillae is shown in Figure 12-2.
   a. Filiform. Threadlike keratinized elevations that cover the dorsal surface of the tongue; they are the most numerous of the papillae.
   b. Fungiform. Mushroom-shaped papillae interspersed among the filiform papillae on the tip and sides of the tongue. On clinical examination they appear redder than the filiform papillae and contain variable numbers of taste buds. The inset enlargement in Figure 12-2 shows the comparative shape and size of the filiform and fungiform papillae.
   c. Circumvallate (vallate). The 10 to 14 large round papillae arranged in a "V" between the body of the tongue and the base. Taste buds line the walls.
III. The Periodontium

The periodontium is the functional unit of tissues that surrounds and supports the tooth. The four parts are the gingiva, periodontal ligament, cementum, and bone; the last three make up the attachment apparatus.

A. Periodontal Ligament

- The periodontal ligament is the fibrous connective tissue that surrounds and attaches the roots of teeth to the alveolar bone.
- The ligament is located in the periodontal space between the cementum and the alveolar bone.
- It is composed of connective tissue cells and intracellular substance.
- The fibers that are inserted into the cementum on one side and the alveolar bone on the other are called Sharpey’s fibers.

B. Periodontal Ligament Fiber Groups

The two general groups of fibers are the gingival groups (around the cervical area within the gingival tissues) and the principal fiber groups (surrounding the root).

1. Gingival Fiber Groups (Figure 12-3)

   - Dentogingival fibers (free gingival). From the cementum in the cervical region into the free gingiva to give support to the gingival.
   - Alveologingival fibers (attached gingival). From the alveolar crest into the free and attached gingiva to provide support.
   - Circumferential fibers (circular). Continuous around the neck of the tooth to help to maintain the tooth in position.
   - Dentoperiosteal fibers (alveolar crest). From the cervical cementum over the alveolar crest to blend with fibers of the periosteum of the bone.
   - Transseptal fibers. From the cervical area of one tooth across to an adjacent tooth (on the mesial or distal only) to provide resistance to separation of teeth (Figure 12-4).

2. Principal Fiber Groups (Figure 12-4)

The five principal groups of collagen fibers are named for their location on the root and for their direction. They are also called the dentoalveolar fiber groups.
Apical fibers. From the root apex to adjacent surrounding bone to resist vertical forces.

Oblique fibers. From the root above the apical fibers obliquely toward the occlusal to resist vertical and unexpected strong forces.

Horizontal fibers. From the cementum in the middle of each root to adjacent alveolar bone to resist tipping of the tooth.

Alveolar crest fibers. From the alveolar crest to the cementum just below the cementoenamel junction to resist intrusive forces.
Interradicular fibers. From cementum between the roots of multirooted teeth to the adjacent bone to resist vertical and lateral forces.

C. Cementum
The cementum is a thin layer of calcified connective tissue that covers the tooth from the cementoenamel junction to, and around, the apical foramen.

1. Functions
   - To seal the tubules of the root dentin.
   - To provide attachment for the periodontal fiber groups.

2. Characteristics
   - Thickness is 50 to 200 µm about the apex; 30 to 60 µm about the cervical area.
   - Vascular and nerve connections are missing; therefore, cementum is insensitive.

Relationship of enamel and cementum at the cervical area is shown in Figure 14-2 (page 257).

D. Alveolar Bone
- The alveolar bone consists of the lamina dura, which surrounds the tooth socket, and the supporting bone.
- When teeth are lost, the alveolar bone is resorbed.
- The bone functions to support the teeth and provide attachment for the periodontal ligament fibers.

E. Gingiva
The part of the masticatory mucosa that surrounds the necks of the teeth and is attached to the teeth and the alveolar bone.

The Gingiva and Related Structures
The gingiva is made up of the free gingiva, the attached gingiva, and the interdental gingiva or interdental papilla.

I. Free Gingiva (Marginal Gingiva)
In health, the free gingiva is closely adapted around each tooth. It connects with the attached gingiva at the free gingival groove and attaches to the tooth at the coronal portion of the junctional
epithelium (Figure 12-5).

A. Free Gingival Groove

- The free gingival groove is a shallow linear groove that demarcates the free from the attached gingiva. Generally, about one-third of the teeth show a visible gingival groove when the gingiva is healthy.2

- In the absence of inflammation and pocket formation, the gingival groove runs somewhat parallel with and about 0.5 to 1.5 mm from the gingival margin,3 and it is approximately at the level of the bottom of the gingival sulcus.

B. Oral Epithelium (outer gingival epithelium, Figure 12-6)

- Covers the free gingiva from the gingival groove over the gingival margin.
- Composed of keratinized stratified squamous epithelium.
C. Gingival Margin (gingival crest, margin of the gingiva, or free margin, Figure 12-5)

- This is the edge of the gingiva nearest the incisal or occlusal surface.
- Marks the opening of the gingival sulcus.

II. Gingival Sulcus (Crevice)

A. Location
The crevice or groove between the free gingiva and the tooth.

B. Boundaries (Figure 12-6)

1. Inner. Tooth surface. May be the enamel, cementum, or part of each, depending on the position of the junctional epithelium.
3. Base. Coronal margin of the attached tissues. The base of the sulcus or pocket is also called...
C. Sulcular Epithelium

The continuation of the oral epithelium covering the free gingiva. Sulcular epithelium is not keratinized.

D. Depth of Sulcus

- Healthy sulci are shallow and may be only 0.5 mm.
- The average depth of the healthy sulcus is about 1.8 mm.4

E. Gingival Sulcus Fluid (sulcular fluid, crevicular fluid)

- A serum-like fluid that seeps from the connective tissue through the epithelial lining of the sulcus or pocket.

![Image](https://pt.wkhealth.com/pt/re/9780781763226/bookContentPane_frame.htm;jsessionid=MQ...)

**FIGURE 12-7** Tooth Eruption and the Gingiva. (A) Before eruption, the oral epithelium covers the tooth. (B) As the tooth emerges, the reduced epithelium joins the oral epithelium as the gingival sulcus is formed. (C) Partial eruption with the junctional epithelium along the enamel. (D) Eruption complete, with junctional epithelium at the cementoenamel junction. (E) From disease or other cause, the attachment migrates along the root surface, exposing the cementum.

- Occurrence is slight to none in a normal sulcus; increases with inflammation. It is part of the local defense mechanism and is able to transport many substances, including endotoxins, enzymes, antibodies, and certain systemically administered drugs.

III. Junctional Epithelium (Attachment Epithelium)

A. Description

- The junctional epithelium is a cuff-like band of stratified squamous epithelium that is
continuous with the sulcular epithelium and completely encircles the tooth.

- It is triangular in cross section, is widest at the junction with the sulcular epithelium, and narrows down to the width of a few cells at the apical end.
- The junctional epithelium is not keratinized. It has two basement membranes: one adjacent to the connective tissue and one adjacent to the tooth surface.

B. Size

- The junctional epithelium may be up to 15 or 20 cells in thickness where it joins the sulcular epithelium and tapers down to 1 or 2 cells in thickness at the apical end.
- The length ranges from 0.25 to 1.35 mm.

C. Position

- As the tooth erupts, the attachment is on the enamel; during eruption, the epithelium migrates toward the cementoenamel junction (Figure 12-7).
- At full eruption, the attachment is usually on the cementum, where it becomes firmly attached (Figure 12-7D).
- With wear of the tooth on the incisal or occlusal surface and with periodontal infections, the attachment migrates along the root surface (Figure 12-7E).

D. Relation of Crest of Alveolar Bone to the Attached Gingival Tissue

- The distance between the base of the attachment and the crest of the alveolar bone is approximately 1.0 to 1.5 mm.
- This distance is maintained in disease when the epithelium moves along the root surface and bone loss occurs.

E. Attachment of the Epithelium to the Tooth Surface

- The junctional epithelium or attachment epithelium provides a seal at the base of the sulcus.
- The attachment, or connecting interface between the tooth and the tissue, is accomplished by hemidesmosomes and the basal lamina of the junctional epithelium.

IV. Interdental Gingiva (Interdental Papilla)

A. Location

- In health, the interdental gingiva occupies the interproximal area between two adjacent teeth.
- The tip and lateral borders are continuous with the free gingiva, whereas other parts are
attached gingiva.

- An interproximal area is also called an embrasure. In Type 1 embrasure the gingival tissue fills the area; in Type 2 embrasure there is slight to moderate recession of the interdental gingiva; in Type 3 embrasure there is extensive recession or complete loss of the of the papilla as shown in Figure 26-1 (page 431).

**B. Shape**

1. **Varies With Spacing or Overlapping of the Teeth.** The interdental gingiva may be flat or saddle-shaped when wide spaces are between the teeth, or it may be tapered and narrow when the teeth are crowded or overlapped.

2. **Between Anterior Teeth.** Pointed, pyramidal.

3. **Between Posterior Teeth**
   - Flatter than anterior papillae because of wider teeth, wider contact areas, and flattened interdental bone.
   - Two papillae, one facial and one lingual, connected by a col, are found when teeth are in contact.

**C. Col**

1. A col is the depression between the lingual or palatal and facial papillae that conforms to the proximal contact area (Figure 12-8).

2. The center of the col area is not usually keratinized and thus is more susceptible to infection. Most periodontal infection begins in the col area.

**FIGURE 12-8** Col. A col is the depression between the lingual or palatal and the facial papillae under the contact area. The contact area is represented by the striped lines. (A) Mesial of mandibular molar to show wide col area. (B) Mesial of mandibular incisor to show a narrow col. The col deepens when gingival enlargement occurs.
V. Attached Gingiva

A. Extent

- The attached gingiva is continuous with the oral epithelium of the free gingiva and is covered with keratinized stratified squamous epithelium.
- Maxillary palatal gingiva is continuous with the palatal mucosa.
- The attached gingiva of the mandibular facial and lingual gingiva and maxillary facial gingiva is demarcated from the alveolar mucosa by the mucogingival junction.

B. Attachment
Firmly bound to the underlying cementum and alveolar bone.

C. Shape
Follows the depressions between the eminences of the roots of the teeth.

VI. Mucogingival Junction

A. Appearance

- The mucogingival junction appears as a line that marks the connection between the attached gingiva and the alveolar mucosa.
- The anterior line is scalloped, but it is fairly straight posterior to the premolars.
- A contrast can be seen between the pink of the keratinized, stippled, attached gingiva and the darker alveolar mucosa.

B. Location

- A mucogingival line is found on the facial surface of all quadrants and on the lingual surface of the mandibular arch.
- There is no alveolar mucosa on the palate. The palatal tissue is firmly attached to the bone of the roof of the mouth.
- The three mucogingival lines are facial mandibular, lingual mandibular, and facial maxillary.
- In Figure 12-9, the facial maxillary and mandibular mucogingival junctions are shown in relation to the attached gingiva and the alveolar mucosa.

VII. Alveolar Mucosa

A. Description

- Movable tissue loosely attached to the underlying bone.
- It has a smooth, shiny surface with nonkeratinized, thin epithelium. Underlying vessels may be
seen through the epithelium.

**B. Frena (singular: frenum or frenulum)**

- **Description.** A frenum is a narrow fold of mucous membrane that passes from a more fixed to a movable part, for example, from the attached gingiva at the mucogingival junction to the lip, cheek, or undersurface of the tongue. A frenum serves to check undue movement.

- **Locations**
  
  a. Maxillary and mandibular anterior frena. At midlines between central incisors. Figure 12-9 shows diagrammatically the location of the anterior frena.
  
  b. Lingual frenum. From undersurface of the tongue.
  
  c. Buccal frena. In the canine–premolar areas, both maxillary and mandibular.

- **Attachment of Frena in Relation to the Attached Gingiva**
  
  a. Closely associated with the mucogingival junction.
  
  b. When the attached gingiva is narrow or missing, the frena may pull on the free gingiva and displace it laterally. A “tension test” is used to locate frenal attachments and check the adequacy of the attached gingiva (page 239).

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**The Recognition of Gingival and Periodontal Infections**

**I. The Clinical Examination**

The recognition of normal gingiva, gingival infections, and deeper periodontal involvement depends on a disciplined, step-by-step examination.

It is necessary to know the **extent** of the disease. **Gingival infections** are confined to the gingiva, whereas **periodontal infections** include all parts of the periodontium, namely, the gingiva, periodontal ligament, bone, and cementum.
A basic examination performed to recognize the signs and effects of inflammation includes information about at least the following markers:

- Gingival tissue changes (color, size, shape, surface texture, position).
- Bleeding and exudates.
- Mucogingival involvement (adequate width of attached gingiva).
- Probing depths; pocket formation (attachment levels).
- Furcation involvement.
- Dental biofilm (and calculus) present.
- Mobility of teeth.
- Radiographic evidence.

II. Signs and Symptoms

- Patients may or may not have specific symptoms to report because periodontal infections are insidious in development.
- Symptoms the patient notices or feels may include bleeding gingiva, sometimes only while brushing, sometimes with drooling at night, or sometimes spontaneously.
- Other possible symptoms are sensitivity to hot and cold, tenderness or discomfort while eating or pain after eating, food retained between the teeth, unpleasant mouth odors, chronic bad taste, or a feeling that the teeth are loose. Most of these are symptoms of advanced disease.

III. Clinically Normal

The terms “clinically normal” or “clinically healthy” may be used to designate gingival tissue that is characterized by the following:

- A shade of pale or coral pink varied by complexion and pigmentation.
- A knife-edged gingival margin that adapts closely around the tooth.
- Stippling; firmness; and minimal sulcus depth with no bleeding when probed.

Although “normal” varies with anatomic, physiologic, and other factors, general characteristics form a baseline for a contrast in the recognition of inflammation.

IV. Causes of Tissue Changes

- Disease changes produce alterations in color, size, position, shape, consistency, surface texture, bleeding readiness, and exudate production.
- To understand the changes that take place in the gingival tissues during the transition from health to disease, it is necessary to have a clear picture of what dental biofilm is, the role of biofilm microorganisms in the development of disease, and the inflammatory response by the body.
When the products of the biofilm microorganisms cause breakdown of the intercellular substances of the sulcular epithelium, injurious agents can pass into the connective tissue, where an inflammatory response is initiated.

An inflammatory response means that there is increased blood flow, increased permeability of capillaries, and increased collection of defense cells and tissue fluid.

The changes produce the tissue alterations, such as in color, size, shape, and consistency, that are described in the next section.

V. Descriptive Terminology

The degree of severity and distribution of a change should be noted when examining the gingiva. When a deviation from normal affects a single area, it can be designated by the number of the adjacent tooth and the surface of the tissue involved, namely, facial, lingual, mesial, or distal.

A. Severity

Severity is expressed as slight, moderate, or severe.

B. Distribution

Terms used for describing distribution are as follows:

1. Localized: The gingiva is involved only about a single tooth or a specific group of teeth.
2. Generalized: The gingiva is involved about all or nearly all of the teeth throughout the mouth. A condition may also be generalized throughout a single arch, the maxillary or mandibular.
3. Marginal: A change that is confined to the free or marginal gingiva. This is specified as either localized or generalized.
4. Papillary: A change that involves a papilla but not the rest of the free gingiva around a tooth. A papillary change may be localized or generalized.
5. Diffuse: Spread out, dispersed; affects gingival margin, attached gingiva, and interdental papillae; may extend into alveolar mucosa. A diffuse condition is more frequently localized, rarely generalized.

VI. Early Recognition of Tissue Changes

Marked changes, such as moderate to severe generalized redness, enlargement, sponginess, deep pockets, and definite mobility, are relatively easy to detect even with limited experience, provided there is good light and accessibility for vision.

In contrast, when changes are subtle, localized about one or a few teeth, and of a lesser degree of severity, more skillful application of knowledge is needed.

Early recognition and treatment of gingival and periodontal infections prevents neglect of conditions that can develop into severe disease. Treatment is less complicated, and the success of treatment and recovery to healthy tissue is predictable when early recognition makes early treatment possible.

The Gingival Examination

The examination of the gingiva includes evaluation of color, size, shape, consistency, surface...
texture, position, mucogingival junctions, bleeding, and exudate. These are summarized in Table 12-1, which is a clinical reference chart.

I. Color

A. Signs of Health

1. **Pale Pink.** Darker in people with darker complexions.

2. **Factors Influencing Color**
   a. Vascular supply.
   b. Thickness of epithelium.
   c. Degree of keratinization.

B. Changes in Disease

1. **In Chronic Inflammation.** Dark red, bluish red, magenta, or deep blue.

2. **In Acute Inflammation.** Bright red.

3. **Extent.** Deep involvement can be expected when diffuse color changes extend into the attached gingiva, or from the marginal gingiva to the mucogingival junction, or through into alveolar mucosa.

II. Size

A. Signs of Health

1. **Free Gingiva.** Flat, not enlarged; fits snugly around the tooth.

2. **Attached Gingiva**
   a. Width of attached gingiva varies among patients and among teeth for an individual, from 1 to 9 mm.5

<table>
<thead>
<tr>
<th>Table 12-1 Examination of the Gingival Clinical Markers</th>
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<tbody>
<tr>
<td><strong>APPEARANCE IN HEALTH</strong></td>
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<tr>
<td><strong>Color</strong></td>
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<table>
<thead>
<tr>
<th>Shape (contour)</th>
<th>Variations in pigmentation related to complexion, race</th>
<th>Chronic: bluish pink, bluish red</th>
<th>Vessels engorged Blood flow sluggish Venous return impaired Anoxemia Increased fibrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Attached gingiva: color change may extend to the mucogingival line</td>
<td>Deepening of pocket, mucogingival involvement</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Not enlarged Fits snugly around the tooth</td>
<td>Enlarged</td>
<td>Edematous: inflammatory fluid, cellular exudate, vascular engorgement, hemorrhage Fibrotic: new collagen fibers</td>
</tr>
<tr>
<td>Marginal gingiva: knife-edged, flat, follows a curved line about the tooth</td>
<td>Marginal gingiva: rounded rolled</td>
<td>Inflammatory changes: edematous or fibrous</td>
<td></td>
</tr>
<tr>
<td>Marginal gingiva:</td>
<td></td>
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<tr>
<td>Papillae: (1)normal contact: papilla is pointed and pyramidal; fills the interproximal area</td>
<td>Papillae: bulbous flattened blunted cratered</td>
<td>Bulbous with gingival enlargement (see edematous and fibrotic, above)</td>
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<tr>
<td>(2)space (diastema) between teeth; gingiva is flat or saddle shaped</td>
<td></td>
<td>Cratered in necrotizing ulcerative gingivitis</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Consistency</th>
<th>Firm</th>
<th>Soft, spongy: dents readily when pressed with probe Associated with red color, smooth shiny surface, loss of stippling, bleeding on probing</th>
<th>Edematous: fluid between cells in connective tissue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attached gingiva firmly bound down</td>
<td>Firm, hard: resists probe pressure Associated with pink color, stippling, bleeding only in depth of pocket</td>
<td>Fibrotic: collagen fibers</td>
</tr>
<tr>
<td>Surface Texture</td>
<td>Free gingiva: smooth</td>
<td>Acute condition: smooth, shiny gingiva</td>
<td></td>
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<tr>
<td></td>
<td>Attached gingiva: stippled</td>
<td>Inflammatory changes in the connective tissue; edema, cellular infiltration</td>
<td></td>
</tr>
<tr>
<td>Position of Gingival Margin</td>
<td>Fully erupted tooth: margin is 1–2 mm above cementoenamel junction, at or slightly below the enamel contour</td>
<td>Chronic: hard, firm, with stippling, sometimes heavier than normal</td>
<td>Edematous or fibrotic Junctional epithelium has migrated along the root; gingival margin follows</td>
</tr>
<tr>
<td><strong>Position of Junctional Epithelium</strong></td>
<td>During eruption along the enamel surface (Figure 12-7) Fully erupted tooth: the junctional epithelium is at the cementoenamel junction</td>
<td>Position determined by use of probe, is on the root surface</td>
<td>Apical migration of the epithelium along the root</td>
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</tbody>
</table>
| **Mucogingival Junctions**           | Make clear demarcation between the pink, stippled, attached gingiva and the darker alveolar mucosa with smooth shiny surface | No attached gingiva:  
  (1) Color changes may extend full height of the gingiva; mucogingival line obliterated  
  (2) Probing reveals that the bottom of the pocket extends into the alveolar mucosa  
  (3) Frenal pull may displace the gingival margin from the tooth | Apical migration of the junctional epithelium  
Attached gingiva decreases with pocket deepening  
Inflammation extends into alveolar mucosa |
| **Bleeding**                         | No spontaneous bleeding or upon probing | Spontaneous bleeding  
Bleeding on probing: bleeding near margin in acute condition; bleeding deep in | Degeneration of the sulcular epithelium with the formation of pocket epithelium  
Blood vessels engorged  
Tissue |
b. Wider in maxilla than mandible; broadest zone related to incisors, narrowest at the canine and premolar regions.

**B. Changes in Disease**

1. *Free Gingiva and Papillae.* Become enlarged. May be localized or limited to specific areas or generalized throughout the gingiva. The col deepens as the papillae increase in size.

2. *Attached Gingiva.* Decreases in amount as the pocket deepens.

**C. Enlargement From Drug Therapy**

Certain drugs used for specific systemic therapy cause gingival enlargement as a side effect. Examples of such drugs are phenytoin, cyclosporine, and nifedipine.

**III. Shape (Form or Contour)**

**A. Signs of Health**

1. *Free Gingiva*
   a. Follows a curved line around each tooth; may be straighter along wide molar surfaces.
   b. The margin is knife-edged or slightly rounded on facial and lingual gingiva; closely adapted to the tooth surface.

2. *Papillae*
   a. Teeth with contact area. Facial and lingual gingiva are pointed or slightly rounded papillae with a col area under the contact (Figure 12-8).
b. Spaced teeth (with diastemata). Interdental gingiva is flat or saddle shaped.

B. Changes in Disease

1. Free Gingiva. Rounded or rolled.

2. Papillae. Blunted, flattened, bulbous, cratered (Figure 12-10).

3. Festoon (“McCall’s festoon”). An enlargement of the marginal gingiva with the formation of a lifesaver-like gingival prominence. Frequently, the total gingiva is very narrow, with associated apparent recession, as shown in Figure 12-10D.

4. Clefts
   a. “Stillman’s cleft” (Figure 12-11). A localized recession may be V-shaped, apostrophe-shaped, or form a slitlike indentation. It may extend several millimeters toward the mucogingival junction or even to or through the junction.

   b. Floss cleft. A cleft created by incorrect floss positioning appears as a vertical linear or V-shaped fissure in the marginal gingiva. It usually occurs at one side of an interdental papilla. The injury can develop when dental floss is curved repeatedly in an incomplete “C” around the line angle so the floss is pressed across the gingiva.
IV. Consistency

A. Signs of Health

1. Firm when palpated with the side of a blunt instrument (probe).
2. Attached gingiva is bound down firmly to the underlying bone.

FIGURE 12-10 Gingival Shape or Contour. (A) Blunted papillae. (B) Bulbous papillae. (C) Cratered papillae. (D) Rolled, lifesaver-shaped “McCall's festoons.”
B. Changes in Disease


2. Soft, Spongy Gingiva. Related to acute stages of inflammation with increased infiltration of fluid and inflammatory elements. The tissue appears red, may be smooth and shiny with loss of stippling, has marginal enlargement, and bleeds readily on probing.

3. Firm, Hard Gingiva. Related to chronic inflammation with increased fibrosis. The tissue may appear pink and well stippled. Bleeding, when probed, usually occurs only in the deeper part of a pocket, not near the margin.

4. Retraction of the Margin Away From the Tooth. Normally, the free gingiva fits snugly about the tooth. When the margin tends to hang slightly away or is readily displaced with a light air blast, the gingival fibers that support the margin have been destroyed (Figure 12-3).

V. Surface Texture

A. Signs of Health


2. Attached Gingiva. Stippled (minutely "pebbled" or "orange peel" surface).

3. Interdental Gingiva. The free gingiva is smooth; the center portion of each papilla is stippled.

B. Changes in Disease

1. Inflammatory Changes. May be loss of stippling, with smooth, shiny surface.
2. **Hyperkeratosis.** May result in a leathery, hard, or nodular surface.

3. **Chronic Disease.** Tissue may be hard and fibrotic, with a normal pink color and normal or deep stippling.

**VI. Position**

The *actual* position of the gingiva is the level of the attached periodontal tissue. It is not directly visible but can be determined by probing.

The *apparent* position of the gingiva is the level of the gingival margin or crest of the free gingiva that is seen by direct observation.

**A. Signs of Health**

For the fully erupted tooth in an adult, the apparent position of the gingival margin is normally at the level of, or slightly below, the enamel contour or prominence of the cervical third of a tooth.
B. Changes in Disease

1. Effect of Gingival Enlargement. When the gingiva enlarges, the gingival margin may be high on the enamel, partly or nearly covering the anatomic crown.

2. Effect of Gingival Recession
   a. Definition. Recession is the exposure of root surface that results from the apical migration of the junctional epithelium (Figure 12-12).
   b. Actual recession. The actual recession is shown by the position of the attachment level. The “receded area” is from the cementoenamel junction to the attachment.
   c. Visible recession. The visible recession is the exposed root surface that is visible on clinical examination. It is seen from the gingival margin to the cementoenamel junction.
   d. Localized recession (Figure 12-13). A localized recession may be narrow or wide, deep or shallow. The root surface is denuded, and the visible recession may extend to or through the mucogingival junction.
   e. Measurement. Both actual and visible recession can be measured with a probe from the cementoenamel junction. Total recession is the actual and visible positions added together.

VII. Bleeding

A. Signs of Health

1. No bleeding spontaneously or on probing.
2. Healthy tissue does not bleed.

B. Changes in Disease

1. Bleeding occurs spontaneously or when probed.
2. Sulcular epithelium becomes diseased pocket epithelium. The ulcerated pocket wall bleeds.

![FIGURE 12-13 Localized Recession. A single tooth may show narrow or wide, deep or shallow recession. (A) Wide, shallow. (B) Wide, deep, with narrow attached gingiva. (C) Narrow, deep, with missing attached gingiva.](http://pt.wkhealth.com/pt/re/9780781763226/bookContentPane_frame.htm;jsessionid=MQ... 11/2/2010)
readily on gentle probing.

**VIII. Exudate**

**A. Signs of Health**

There is no exudate except slight gingival sulcus fluid. Gingival sulcus fluid cannot be seen by direct observation.

**B. Changes in Disease**

1. Increased gingival sulcus fluid.
2. Amount of exudate is not an indicator of the extent of disease or the depth of the periodontal pockets.

**The Gingiva of Young Children**

**I. Signs of Health**

**A. Primary Dentition**

1. **Color.** Pink or slightly red.
2. **Shape.** Thick, rounded, or rolled.
3. **Consistency.** Less fibrous than adult gingiva; not tightly adapted to the teeth; may be easily displaced with a light air jet.
4. **Surface Texture.** May or may not have stippling; high percentage of patients has shiny gingiva.
5. **Attached Gingiva.** Width of attached gingiva in children aged 3 to 5 years: between 1 and 6 mm.
6. **Interdental Gingiva**
   a. **Anterior:** diastemata are frequently present and the papillae are flat or saddle shaped.
   b. **Posterior:** col between facial and lingual papillae when teeth are in contact (Figure 12-8).

**Everyday Ethics**

Britain and Nicholas were first-year dental hygiene students just beginning to practice on each other as student partners in the preclinic program. During the oral examination, Britain noticed that Nicholas had some areas of bleeding and changes in the contour of the marginal gingiva. In general, the soft tissue seemed more sponge-like and loose, but Britain was not sure she clearly understood what is considered “normal,” remembering that the clinical instructor often referred to a “range” of normal.

Britain decided to focus on and document the areas that were pale pink, firm, and pointed in the interproximal areas. She carefully recorded this information with great detail and then signaled for her instructor to verify the findings. When the instructor sat down and reviewed the
examination she was pleased with Britain's thoroughness. The instructor provided positive feedback and quickly moved on to the next pair of students. Britain began to feel uneasy that she hadn't pointed out the gingival tissues that she thought were possibly inflamed.

**Questions for Consideration**

1. Explain how the ethical principles of autonomy, beneficence, and veracity apply to this situation.
2. Indicate how Nicholas is the center of this dilemma both from the perspective of Britain, a student, and the clinical instructor who finds out from another faculty member that he or she thinks Nicholas has definite signs of periodontal disease.
3. Ethically, what alternatives or actions can Britain take at this time to address the “uneasy” feeling she has about Nicholas' gingival status?

**B. Mixed Dentition**

- Constant state of change related to exfoliation and eruption.
- Free gingiva may appear rolled or rounded, slightly reddened, shiny, and with a lack of firmness.
- The gingiva covers a varying portion of the anatomic crown, depending on the stage of eruption (Figure 12-7).

**II. Changes in Disease**

Examination of the periodontal tissues of a child is not different from that of an adult. A complete examination is necessary, including probing around each tooth.

Gingivitis occurs frequently in children but is usually reversible without leaving permanent damage.

Although relatively rare, periodontitis can occur in primary dentition.

Mucogingival problems occur in children.9,10 The recognition of deficiencies of attached gingiva has particular significance for the child who will need orthodontic treatment.

**The Gingiva after Periodontal Surgery**

The characteristics of “normal healthy gingiva” take on different dimensions for the patient who has completed treatment for pockets, bone loss, and other signs of a periodontal infection. The junctional epithelium is apical to the cementoenamel junction. After healing, the sulcus depths may be within normal range and no bleeding occurs when probed.

Depending on the exact treatment performed, examination shows changes from the initial evaluation. For example, where the initial examination showed a deficiency of attached gingiva with frenal pull, mucogingival surgery may have been designed and treatment satisfactorily completed to create new attached gingiva. With each maintenance appointment, a thorough, careful examination is necessary to control factors that may permit recurrence of disease.

**Factors To Teach The Patient**
Characteristics of normal healthy gingiva.
- The significance of bleeding; healthy tissue does not bleed.
- Relationship of findings during a gingival examination to the personal daily care procedures for infection control.
- The special attention needed for an area of gingival recession to prevent abrasion, inflammation, and further involvement.
- How the method of brushing, stiffness of toothbrush filaments, abrasiveness of a dentifrice, and pressure applied during brushing can be factors in gingival recession.

References


**Gingiva of Children**


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