

### ***Gingival sulcus and Dentogingival junction***

**Gingival sulcus or crevice** is the name given to the invagination made by the gingival as it joins with the tooth surface. The gingiva does not join the tooth at the gingival margin. It forms a small infolding known as the *sulcus*.

The sulcus extends from the free gingival to dentogingival junction. The sulcular (crevicular) ep. is nonkeratinized and it lacks epithelial ridges and so forms a smooth interface with the lamina propria. It is thinner than the epithelium of the gingiva. The sulcular epithelium is continuous with the gingival epithelium and the attachment epithelium. These three epithelia have a continuous and coextensive basal lamina.

### **Dentogingival junction**

The junction of the gingiva and the tooth is of great physiologic and clinical importance. This union is unique in many ways and may be a point of lessened resistance to mechanical forces and bacterial attack. The gingiva consists of two tissues maintaining the junction intact. (1) The dense, resilient lamina propria takes up impacts produced during mastication. (2) The keratinized or parakeratinized surface of the gingiva. When the epithelium is injured, the injury is repaired by the turnover of cells and their ability to migrate. When the connective tissue is injured, ribosomes within the fibroblasts form molecules of the precursor protein of collagen (procollagen) and ground substances as well, contributing to repair.

Defense against bacterial injury is a function of the defense mechanism of the body. Macrophages, lymphocytes, plasma cells, polymorphonuclear leukocytes, and Langerhans cells protect against

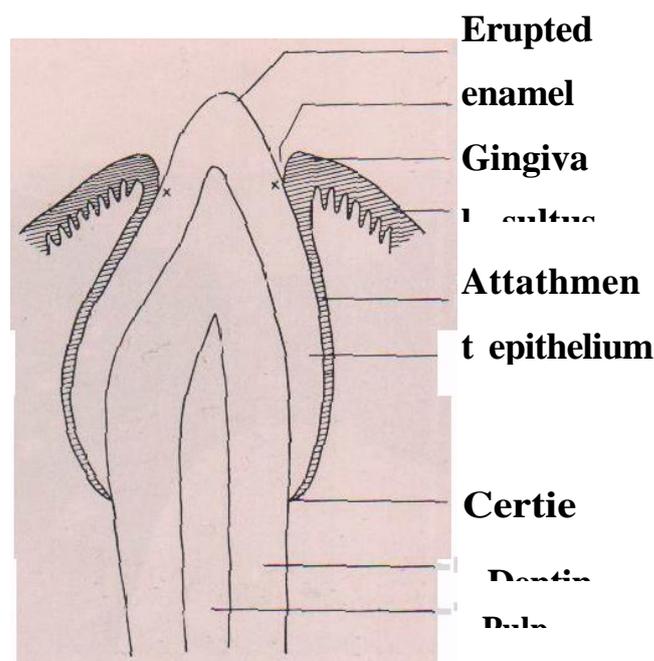
invasion and form antibodies against bacterial antigens.

Both epithelium and connective tissue are attached to the tooth, and in health each contributes to the integrity of the dentogingival junction. Again the firmness of this junction is maintained by the gingival portion of the periodontal ligament. It is weakened by any situation that causes the collagen to break down (collagenolysis). The adherence of epithelium to the tooth is a function of the attachment (junctional) epithelium. It is weakened by any cause that injures the epithelium.

**Development of junctional (attachment) epithelium.** When the ameloblasts finish formation of the enamel matrix, they leave a thin membrane on the surface of the enamel, the *primary enamel cuticle*. The ameloblasts shorten after the primary enamel cuticle has been formed, and the epithelial enamel organ is reduced to a few layers of flat cuboid cells, which are then called *reduced enamel epithelium*. Under normal conditions it covers the entire enamel surface, extending to the C.E.J and remains attached to the primary enamel cuticle. During eruption, the tip of the tooth approaches the oral mucosa, and the R.E.ep and the oral ep. meet and fuse. The remnant of the primary enamel cuticle after eruption referred to as **Nasmyth's membrane**.

The epithelium that covers the tip the crown degenerates in its center, and the crown emerges through this perforation into the oral cavity .The R.E.ep.remains attached to the part of the enamel that not yet erupted. Once the tip of the crown has emerged, the reduced enamel ep. is termed the **primary attachment epithelium**. As the crown erupts, the reduced enamel epith. grows gradually shorter. A shallow groove the *gingival sulcus* may develop between the gingiva and the surface of the tooth and extend around its CIRCUMFERENCE.

The sulcus bounded by the attachment ep. At its base and by gingival margin laterally. The firmness and mechanical strength of dentogingival junction is mainly attributed to the C.T. attachment as the ep. Attachment is loose or weak.



. Diagram of attached epithelial cuff and gingival sulcus at an early stage of tooth eruption. Bottom of sulcus at X.

### **Shift of dentogingival junction.**

The position of the gingiva on the surface of the tooth changes with time. When the tip of the enamel first emerges through the mucous

membrane of the oral cavity, the epithelium covers almost the entire enamel . The tooth erupts until it reaches the plane of occlusion .The attachment epithelium separates from the enamel surface gradually while the crown emerges into the oral cavity. \_When the tooth first reaches the plane of occlusion, one third to one fourth of the enamel still remains covered by the gingiva. A gradual exposure of the crown follows. The actual movement of the teeth toward the occlusal plane is termed **active eruption**. The separation of the primary attachment epithelium from the enamel is termed **passive eruption**. Further recession exposing the cementum may ultimately occur. When the red. enamel epithelium has disappeared, primary attachment epithelium is replace by a *secondary attachment epithelium* derived from the gingival epithelium.

**Shift of dentogingival junction involves 4 stages** ,the first two be physiologic while the last two are pathologic.

**First stage.** The bottom of the gingival sulcus remains in the region of the enamel, and the apical end of the attachment ep. Stays at the C.E.J This relation persists in primary teeth almost up to one year of age before shedding and in permanent teeth, usually to the age of 20 or 30

**Second stage.** The bottom of the gingival sulcus is still on the enamel, and the apical of the attachment epithelium has shifted to the surface of the cementum ,  
*This stage of tooth exposure may persist to the age of 40 years or latter.*

**Third stage.** When the bottom of the gingival sulcus is at the C.E.J and the epithelium attachment is entirely on the cementum, and the enamel-covered crown is fully exposed ). This stage in the exposure of a tooth no longer is a passive manifestation.

**Fourth stage.** The fourth stage represents recession of the gingiva. When the **entire attachment is on cementum**, the gingiva may appear

normal but is believed to have receded as a result of **pathology**. It may occur without other clinical evidence of inflammatory periodontal disease.

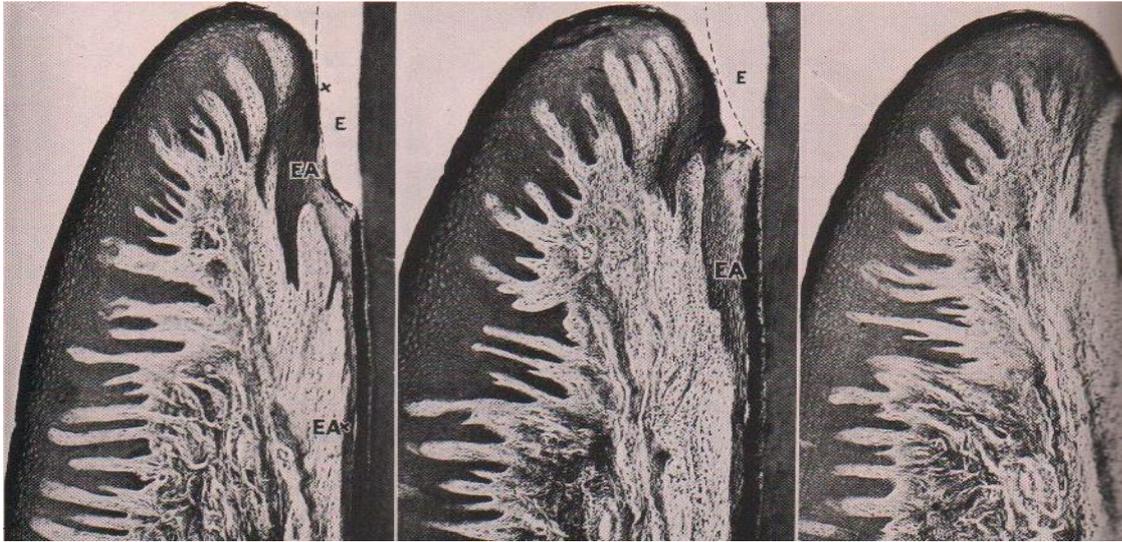
The rates of crown exposure and recession vary in different persons. In some cases the fourth stage is observed in persons during their twenties. In others, even at 50 years of age or older the teeth are still in the first or second stage. The rate varies also in different teeth of the same jaw and on different surfaces of the same tooth. One side may be in the first stage and the other in the second or even the fourth stage.

Gradual exposure of the tooth makes it necessary to distinguish between the anatomic and the clinical crown . **That part of the tooth cover by enamel is the anatomic crown. The clinical crown is the part of the tooth exposed in the oral cavity.** In the first and second stages the clinical crown is smaller than anatomic crown. With recession ( third stage) the entire enamel-covered part tooth is exposed, and the clinical *crown* equal to the anatomic crown. In the fourth stage the clinical crown is larger than the anatomic because parts of the root have been exposed. This type of crown exposure is to be differentiated from crown exposure that is produced by periodontal disease, loss of attachment (bone), and pocket formation.

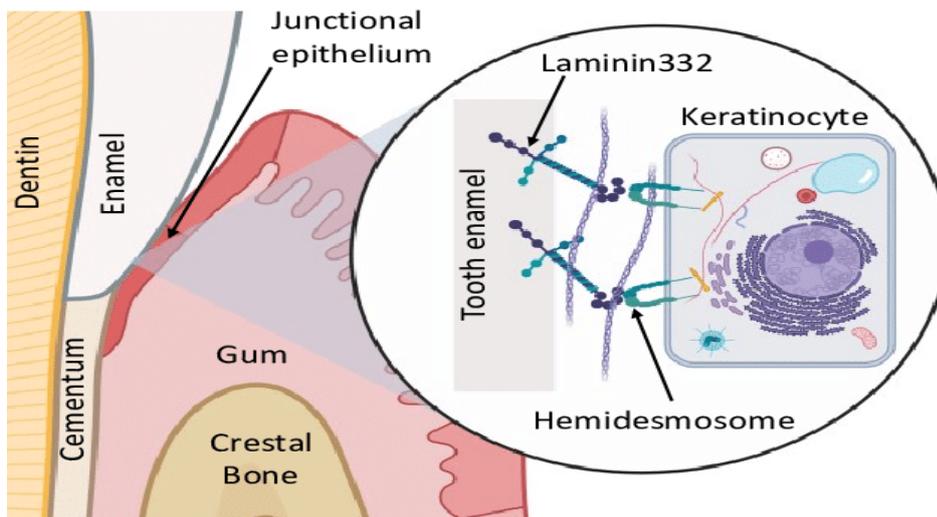
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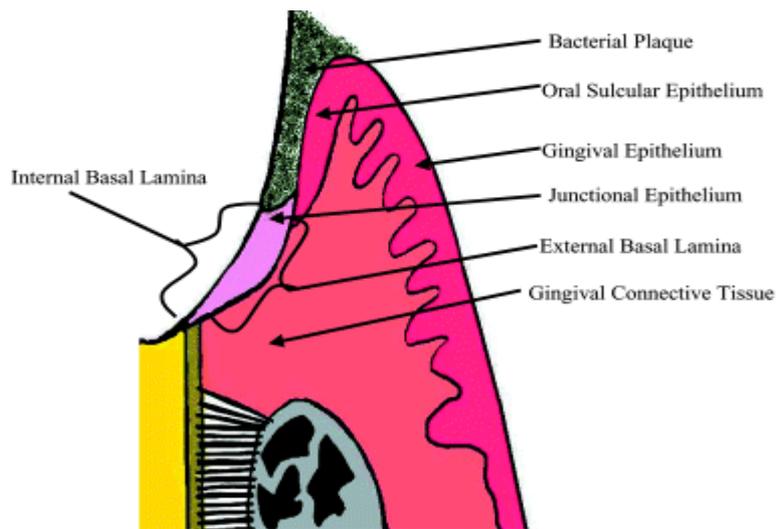
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Three sections of same tooth showing different relation of soft to hard tissues A, Bottom of sulcus on enamel (second stage). B, Bottom of sulcus at cemento-enamel junction (third stage). C, Bottom of sulcus on cementum (fourth stage). E, Enamel lost in decalcification (*dotted line*). EA, attachment epithelium; X, bottom of gingival sulcus; XX, end of attachment epithelium.





**Deepening of sulcus (pocket formation).** gingival sulcus forms when the tip of crown emerges through the oral mucosa. It deepens as a result of separation of the reduced E. epithelium from the active erupting tooth. Under normal conditions the depth of the sulcus is variable; 45% of all measured sulci are below 0.5 mm. The **average** sulcus is 1.8 mm. The more shallow a sulcus, the more likely that the gingival margin is not inflamed.