

## **Physiological tooth movement**

### **-Eruption & shedding:-**

Eruption means axial or occlusal movement of the tooth from its developmental position within the jaw to its functional position in the occlusal plane . teeth develop within the tissues of the jaw, and considerable movement is required to bring them into the occlusal plane to be functional. teeth movements may be described as follows....

#### **1. Preeruptive tooth movement:**

The preeruptive movements of teeth are the means by which the teeth are placed in a position within the jaw for eruptive movement.

The preeruptive movement of teeth are a combination of two factors:-

a- total bodily movement of the tooth germ & growth in which one part of the tooth germ remains fixed while the rest continues to grow, leading to change in the center of the tooth germ, this explains for example, how the deciduous incisors maintain their position relative to the oral mucosa as the jaws increase in height.

Preeruptive movement occur in an intraosseous location & are reflected in the patterns of bony remodeling within the crypt wall. Ex. During bodily movement in mesial direction bone resorption occur in mesial surface of the crypt wall and bone deposition occur in distal wall.

b- during eccentric growth: only bony resorption occurs at altering the shape of the crypt to accommodate the altering shape of the tooth germ.

#### **2. Eruptive tooth movement:**

The mechanism of eruption for decide. & permanent teeth are similar resulting in the axial or occlusal movement of the tooth from its developmental position within the jaw to its final functional position in the occlusal plane .

#### **Histologically:**

Many changes occur with & for accommodation of tooth eruption. The periodontal ligament develop only after root formation is initiated. The remodeling of PDL fiber bundles is achieved by fibroblast, which synthesize and degrade the collagen fibrils as required to extent of ligament. Tissues in advance of erupting permanent tooth differs from

that in advance of a deciduous tooth, the fibrocellular follicle surrounding a permanent tooth retains its connection with the lamina propria of the oral mucous membrane. By means of a strand of fibrous tissue containing remnants of dental lamina known as the gubernacular cord which are contained in holes in the jaws lingual to deciduous teeth called gubernacular canals which widen by osteoclastic activity preparing an eruptive pathway for the tooth appears in the oral cavity, it is subjected to environmental factors to determine its final position in the dental arch. Muscle forces from the tongue, cheeks & lips play on the tooth, as do the forces of contact of the erupting tooth with other erupted teeth.

### **Mechanisms of tooth movement:-**

Numerous theories explain tooth eruption as: root elongation, alveolar bone remodeling & to some extent formation of the PDL.

#### **1-Root formation:-**

This causes tooth eruption because it increases the length of the tooth that must be accommodated by root growth into bone of the jaw, by an increase in jaw height or by occlusal movement of the crown. Depending on the rate at which the root elongates, the bone of socket by the force that produces by root growth at the base will resorb or form to maintain a proper relationship between the root and the bone.

#### **2-Bone remodeling:-**

Bone remodeling of the jaw is linked to the tooth movement, in that, the growth pattern of the jaw is supposed to move teeth by selective bone resorption & deposition.

#### **3-Dental follicle:**

Investigations indicate that dental follicle is necessary to permit the bony remodeling that occurs with tooth movement by differentiation of osteoclasts and the reduced enamel epithelium secretes proteases that assist in C.T. breakdown to produce a path of least resistance.

#### **4-PDL:**

PDL remodeling is important in tooth eruption because of the traction power of fibroblasts.

## **Posteruptive tooth movement:**

Are divided into:

**1-movements to accommodate growing jaws.** They appear histologically as readjustment of the position of the tooth socket, by new bone formation at the alveolar crest & on the socket floor to compensate with the increasing height of the jaws.

### **2-compensation for continued occlusal wear:**

This is achieved by continued cementum deposition around the apex of the root which occurs only after the tooth has moved.

### **3- accommodation for interproximal wear:**

This is achieved by a process called proximal drift, the forces causing this drift are multifactorial, including occlusal force, contraction of transeptal ligament between teeth , & soft tissue pressure.

## **Shedding of teeth:**

As the permanent incisors, canines & premolars, develop, increase in size & begin to erupt they influence the pattern of deciduous teeth resorption & exfoliation (shedding). The permanent incisors & canines develop lingual to deciduous teeth causing their root resorption and these teeth are shed with much of their pulp chamber intact. Permanent premolars develop between the divergent roots of deciduous molars causing resorption of interradicular dentin & pulp or even enamel.

The physiologic process resulting in the elimination of the deciduous dentition is called shedding or exfoliation.

## **Odontoclasts:-**

These cells resorb hard dental tissues, they are derived from the monocytes and migrate from b.v.s. to the resorption site, fusing & forming multinucleated cells with a ruffled border, then the tooth sheds.

## **Pressure:-**

Pressure from the erupting permanent tooth plays a role in shedding, so if there is a congenital missing of a permanent tooth germ shedding is delayed. Also growth of the face, & jaws & increase in size & strength of muscles of mastication probably increase the forces applied to the deciduous tooth so the supporting apparatus of the tooth specially the PDL is damaged & resorption is initiated.

## **Clinical consideration:-**

### **Tooth ankylosis:**

A lack of eruption may be related to the fusion of tooth roots to the bony socket or the crown of permanent tooth.

### **Retained deciduous tooth:**

This may be due to lack of development of the permanent successor.

### **Submerged tooth:-**

This occurs when eruption is prevented because of crowding or tipping of the adjacent teeth into the space created by a missing tooth.

Local or systemic abnormality may affect the process of tooth development & eruption .