BIOLOGY OF TOOTH MOVEMENT

INCLUDES:
TOOTH SUPPORTING TISSUES
PHYSIOLOGIC TOOTH MOVEMENT
ORTHODONTIC TOOTH MOVEMENT

Faculty: Mohammed Itani, DMD. Joseph Ghafari, DMD.

Goals: This series of lectures and seminars should enable the resident to:
1. Learn about the tissue reaction in orthodontics.
2. Understand the biologic response of periodontal structures to orthodontic forces.
3. Review the biology of supporting tissues.
4. Know about the transmission of mechanical influence into cellular reactions.
5. Understand the tissue response in sutures.
6. Understand the tissue response in the temporo-mandibular joints.

Objectives: The resident should know:
1. The cellular and morphological reaction to tooth movement whether with either controlled or uncontrolled forces i.e. occlusal trauma.
2. The variety of the periodontal tissue response to different types of tooth movement.
3. The prevention of adverse effect of tooth movement based on patient’s periodontal health condition.
4. The potential adverse effect to the periodontium and the proper management by referral to the periodontist.
COURSE DURATION AND SCOPE: This course is scheduled between February and March for the first year residents. It is given every Wednesday at a 2-hour session between 8:00 a.m and 10:00 a.m and imparts fundamental information on the mechanism of tooth movement and the physiological changes associated with it.

POLICY ON EXAMINATIONS: Final examination is given for this course, usually scheduled in July. During the course, any number of progress tests or assignments may be given. Their cumulative weight in proportion to the final grade may not exceed 50%.

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SUMMARY OUTLINE

- TOOTH SUPPORTING TISSUES
  - PHYSIOLOGIC TOOTH MOVEMENT
  - ORTHODONTIC TOOTH MOVEMENT

COURSE OUTLINE

1. TOOTH SUPPORTING TISSUES
   A. Gingiva
   B. Periodontal ligament
   C. Cementum
   D. Alveolar bone

2. PHYSIOLOGIC TOOTH MOVEMENT
   A. In human beings and other primates, the teeth in the posterior segment migrate mesially, whereas in rodents they migrate distally.
   B. Changes in the equilibrium of occlusion such as loss of adjacent teeth can also lead to mesial drift and loss of arch integrity.
   C. With teeth migration, supraalveolar fiber system will move as well dictating a remodeling in the PDL.
   D. Physiologic migration is usually related to mesiodistal movement.

3. ORTHODONTIC TOOTH MOVEMENT
   A. Tissue response in periodontium.
      a. Hyalinization
      b. Degeneration
      c. Elimination
      d. Reestablishment
   B. Secondary period of tooth movement
      a. Direct bone resorption
      b. Deposition of new bone
c. Cell proliferation after 30-40 hours in young human beings

C. Transmission of mechanical influence into cellular reaction
   a. Piezoelectricity
   b. Nervous and immune systems

D. Biomechanical factors and tissue reaction in the periodontium
   a. Orthodontic forces: continuous vs. intermittent forces
   b. Magnitude of forces
   c. Duration of force

E. Types of tooth movement
   a. Tipping
   b. Torque
   c. Bodily movement
   d. Rotation
   e. Extrusion
   f. Intrusion

F. Tissue response in sutures
   a. Structure of sutures
   b. Sutures response to orthodontic forces
   c. Tissue response in the tempromandibular joint region

G. Iatrogenic response of supporting tissue in orthodontics
   a. Damage to periodontal tissues
   b. Gingival inflammation
   c. Alveolar bone loss
   d. Marginal bone recession
   e. Damage to tooth enamel surfaces
   f. Pulpal reaction
   g. Root resorption

REFERENCES