Orthodontic tooth movement/ Biomechanics of Tooth Movement

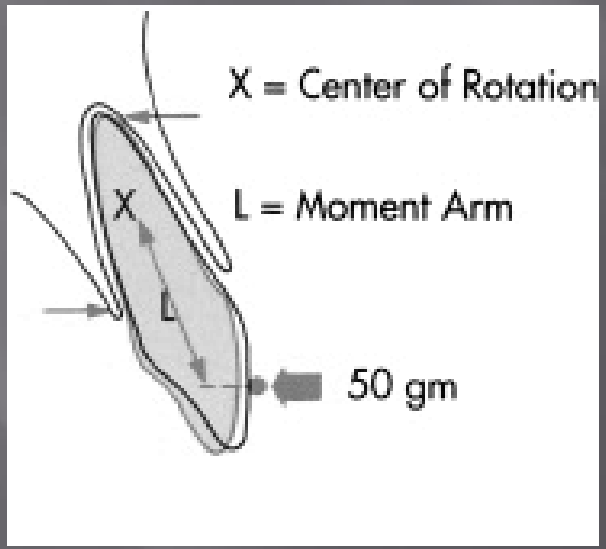
Dr. Ayshan KOLEMEN

Terms

- Center of resistance (CR): point at which resistance to movement can be concentrated

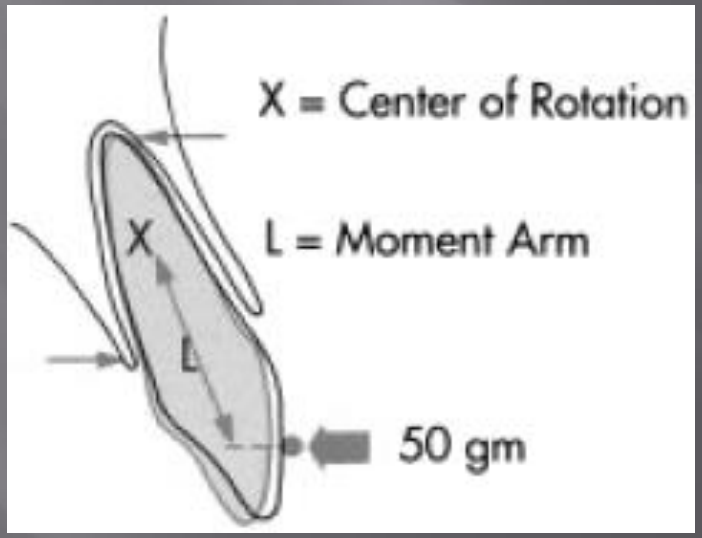
Object in free space: CR=center of mass

- Tooth root: CR=halfway between root apex and crest of alveolar bone



Terms

- Center of rotation: point around which rotation occurs when object is being moved
- Can be used to create bodily tooth movement

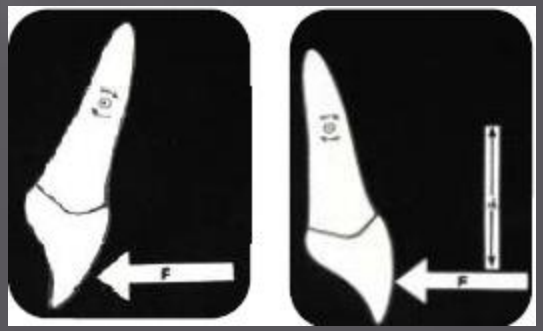


Effects of types of tooth movement

1. Tipping Movement

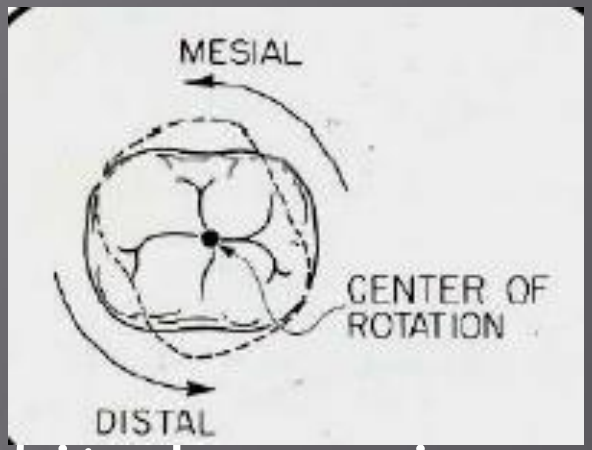
- It is the simplest form of orthdontic tooth movement.
- Produced when single force is applied.
- The tooth rotates around its center of resistance producing diagonal opposite areas of compression and tension within the pdl
- During tipping the crown of the tooth moves much more than does the root.

- Force : 50-75 gr



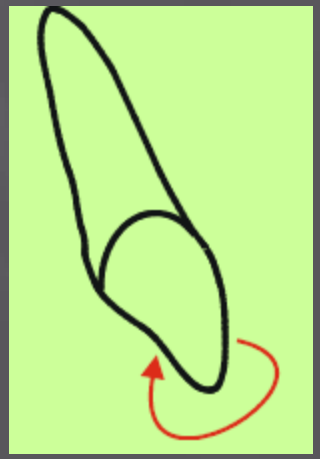
2. Translation movement (Bodily movement)

- Crown and root are moved in the same direction at the same time.
- Force :100-150gr



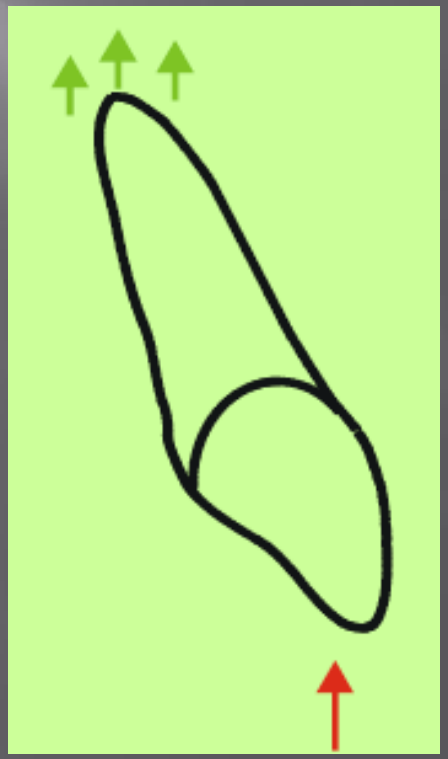
3. Rotation movement

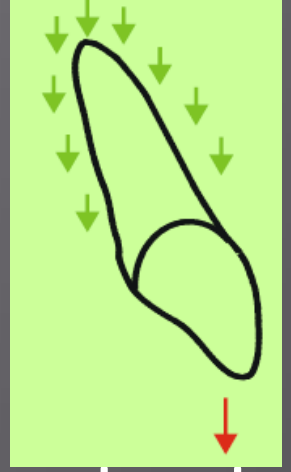
- Movement of the tooth around its long axis.
- It is a difficult type of tooth movement to correct and retain .
- High relapse tendencies with rotation is because of presence of elastic fibres in supra alveolar tissue.
- Force: 50-100 gr



4. Intrusion movement

- Movement of the tooth in an apical direction Very light forces are used for intrusion of teeth.
- Force: 15-25 gr



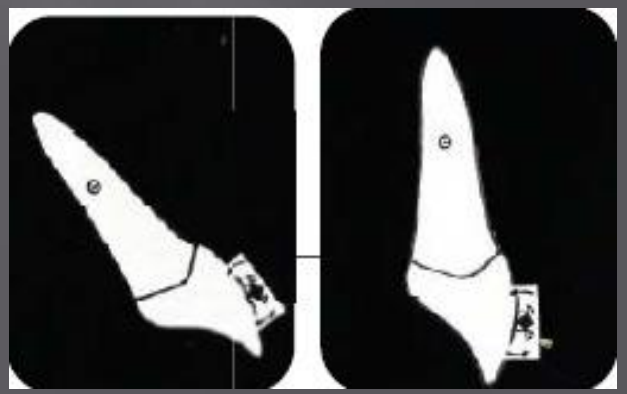


5. Extrusion movement

- Movement of the tooth in an occlusal direction
- This is the easiest of all movements.

6. Torque movement

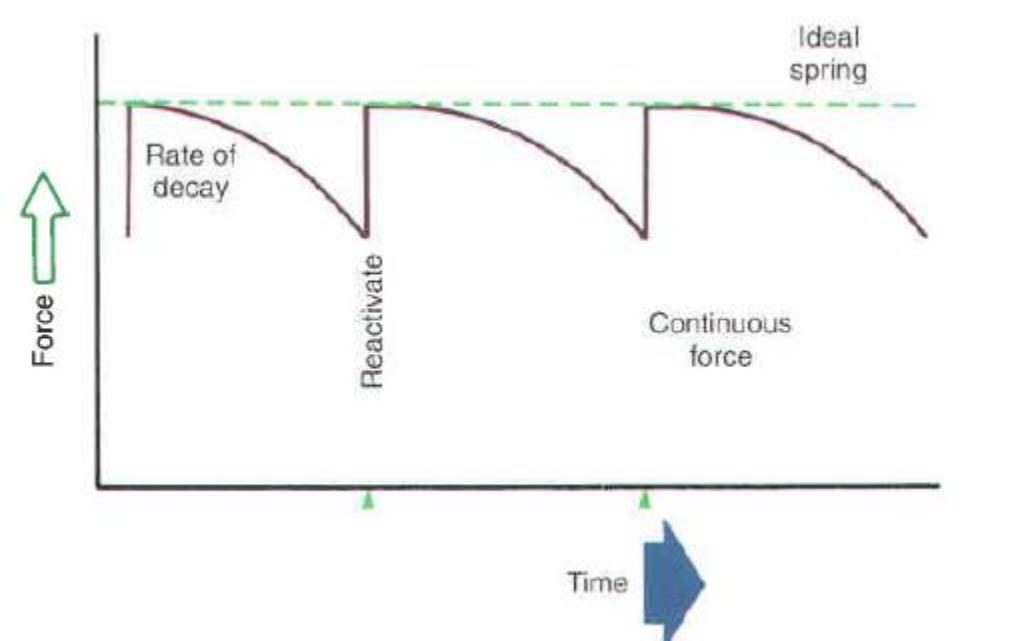
- Movement of the root with minimal movement of the crown.
- Force:50 gr

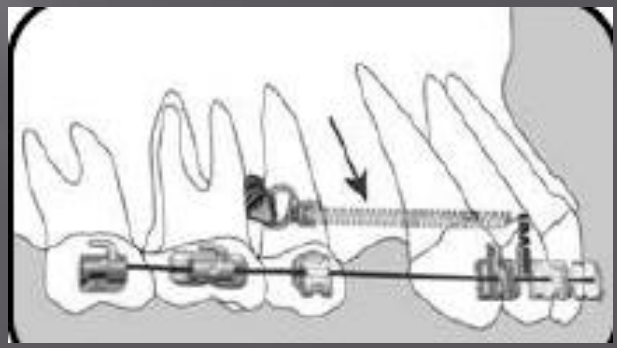


Effects of force duration and force decay

1. Continuous force

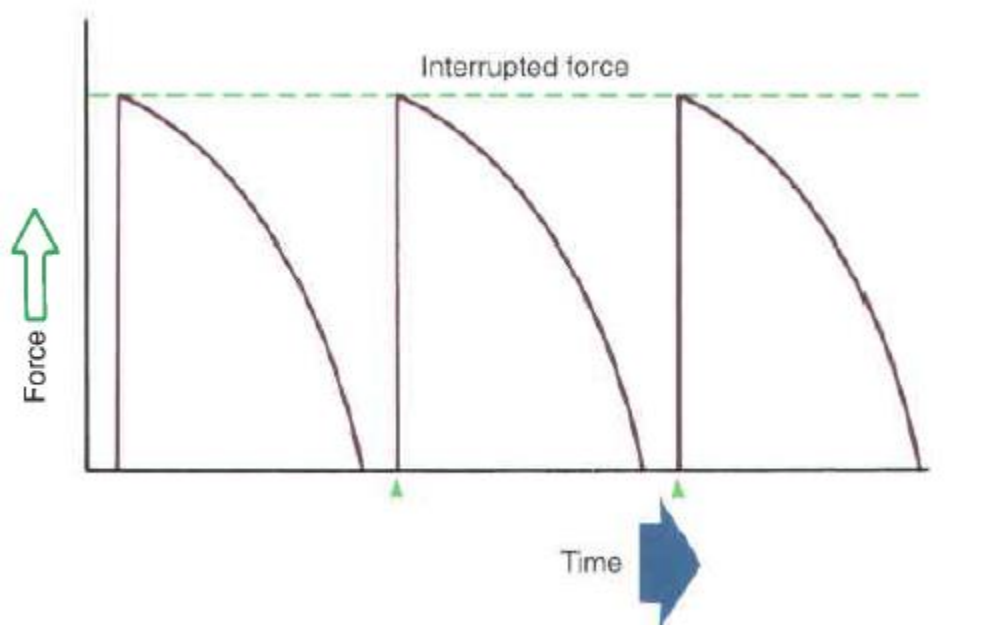
- Maintain approximately the same force magnitude over a period of time (patient visit to the next), example a coil spring





Effects of force duration and force decay

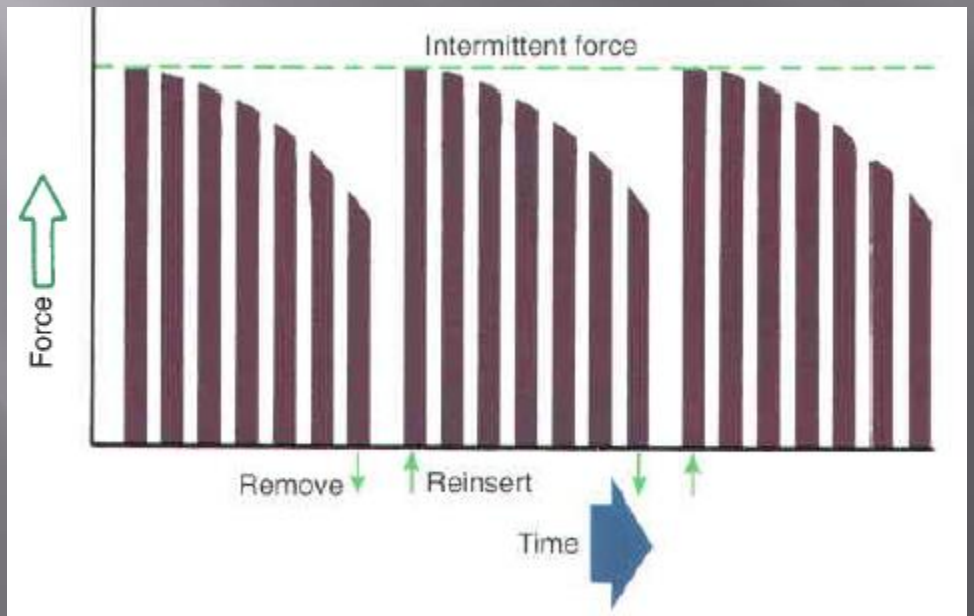
2. Interrupted (dissipating) forces
   - force level decline to zero between activations. Both of continuous and interrupted forces can be produced by fixed appliances that are constantly present.



Effects of force duration and force decay

3. Intermittent force

- force levels decline abruptly to zero intermittently. This kind seen in all patient activated appliances like: removable appliance.



- Tipping movement → Removable appliance

- Tipping
- Bodily
- Intrusion → Fixed appliance
- Extrusion
- Rotation
- Torq

Orthodontic adverse effects

- Pulp : minimal effect. Transient inflammatory response.
- Can cause loss of vitality:
  - Excessive force
  - In approprite movement

Orthodontic adverse effects

- Root: some resorption of root occurs usually repaired by cementum.
- Repaires occur during 'rest' periods but permanent damage occurs to root apex commonly lose 1-2 mm root length
- At risk: distorted apices, thin roots, compromised teeth, excess force, history of previous idiopathic resorption.

Orthodontic adverse effects

- PDL: minimal transient damage unless:
- Excessive force
- Periodontal disease

Orthodontic adverse effects

- Bone: minimal transient damage but: loose ½-1 mm of alveolar crest.

THANK YOU