BIOMECHANICS OF TOOTH MOVEMENT

• Mechanics: The science which deals with the action of forces on the form and motion of bodies
• Force: Energy or strength brought to bear causing motion or change in a body.

• Orthodontic appliance: A system storing and delivering forces against the teeth, muscles, and/or bones; creating a reaction within the periodontal ligament and alveolar bone that causes movement of the teeth or alters bone morphology or growth.
FORCE

Magnitude
Point of application
Direction
• Center of Resistance: The center of mass or center of gravity
Orthodontic appliance

- Active element
- Resistance element
• Anchorage: Resistance to displacement

• The anchorage unit can move, however its role is to provide resistance.

Anchorage is classified according to:

1. Manner of force application
   a. Simple anchorage
Simple anchorage (resistance to tipping):
the anchorage tooth is ‘free’ to tip during movement
Anchorage is classified according to:

1. Manner of force application
   a. Simple anchorage
   b. Stationary anchorage

Stationary anchorage (resistance to bodily movement): the anchorage tooth is permitted to translate only.
Anchorage unit  Active element

Anchorage unit  Active element
Anchorage is classified according to:

1. Manner of force application
   a. Simple anchorage
   b. Stationary anchorage
   c. Reciprocal anchorage
• Reciprocal anchorage: where both bodies which are malposed act as resistance and active elements.
Anchorage is classified according to:

1. Manner of force application
   a. Simple anchorage
   b. Stationary anchorage
   c. Reciprocal anchorage
2. According to the jaws involved
   a. Intra-maxillary anchorage

Intra-maxillary anchorage: anchorage established in the same jaw as the active element.
• Inter-maxillary anchorage – anchorage established in the opposite jaw of the active element
3. Site of anchorage
   a. Intra-oral; utilizing the teeth, mucosa and other oral structures
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   a. Intra-oral; utilizing the teeth, mucosa and other oral structures
   b. Extra-oral; anchorage established outside of the oral cavity

- Cervical
- Occipital
- Cranial
- Facial
• 4. Number of anchorage units; the number of teeth, number of roots
• Couple – Produced by two forces of equal magnitude with opposite, parallel, but non-collinear lines of action.
A couple produces pure rotation. Tendencies for translation are canceled out.

F1 → F2

A couple produces pure rotation. Tendencies for translation are canceled out.

F1 → F2
Class II mechanics, elastics, force
Extrusion

Bone

Oral cavity