

# Anchorage

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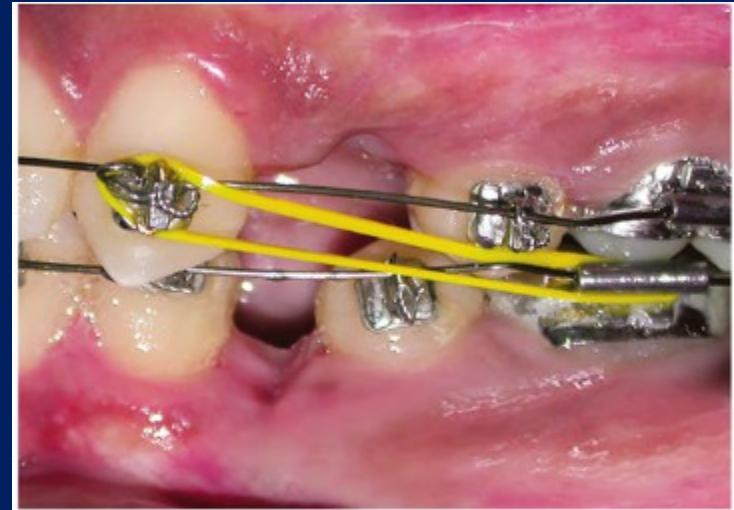
- Anchorage in orthodontics is defined as **resistance to unwanted tooth movement.**
- The nature and degree of resistance to displacement offered by an anatomic unit when used for the purpose of affecting tooth movement.

- The dentist or orthodontist always constructs an appliance to produce certain desired tooth movements.
- For every (desired) action there is an equal and opposite reaction. Inevitably, reaction forces can move other teeth as well if the appliance contacts them.
- Anchorage, then, is the resistance to reaction forces that is provided (usually) by other teeth, or (sometimes) by the palate, head or neck (via extraoral force), or implants in bone.

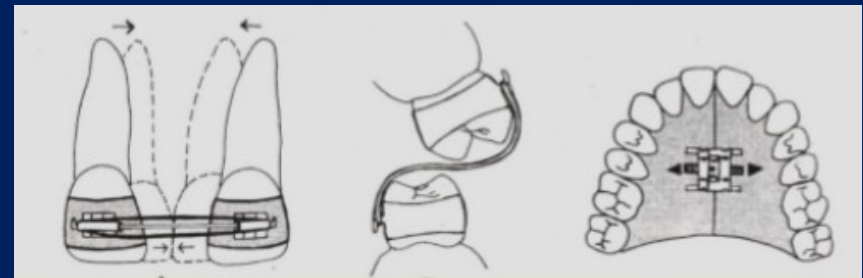
# Classification of anchorage

- 1- Depending on manner of force application:
  - a. Simple
  - b. Stationary
  - c. Reciprocal

- **Simple anchorage:** anchor tooth will be **tipped** if it can not overcome the resisting force.
- **Stationary anchorage:** anchor tooth would be moved **bodily** if it can not overcome the resisting force.
- **Reciprocal anchorage :** It involves **pitting of two teeth or two groups of teeth of equal anchorage value against each other to produce reciprocal tooth movement.**• Eg: closing of diastemas: two central incisors are pitted against each other.



**Fig. 10:** Intermaxillary anchorage (stationary anchorage—the maxillary molars are bodily pitted against the tipping forces of the maxillary anteriors)





**Fig. 12A:** Cross-bite elastics are used to push the maxillary molars labially and the mandibular molars lingually (reciprocal anchorage), using elastics



**Fig. 12B:** Reciprocal anchorage is made use of in expansion of the upper arch using a rapid maxillary expander (RME) (Photo Courtesy: Scheu-Dental, Germany)

2- Depending on jaws involved:

a. **Intermaxillary anchorage**

b. **Intramaxillary anchorage**



**Fig. 10:** Intermaxillary anchorage (stationary anchorage—the maxillary molars are bodily pitted against the tipping forces of the maxillary anteriors)



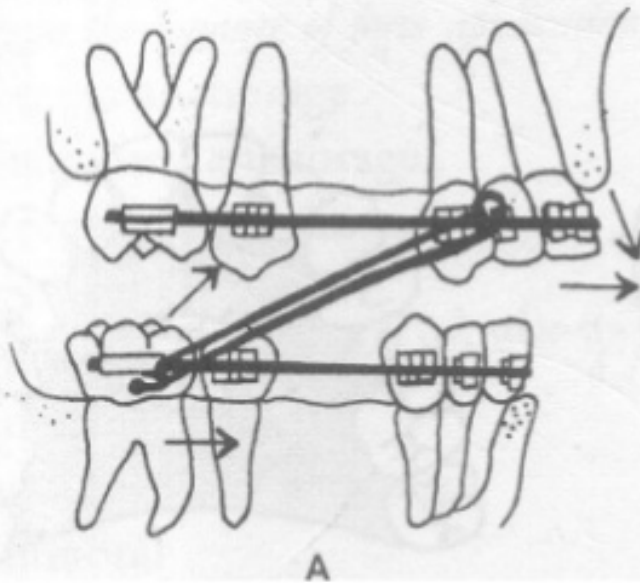
**Fig. 9:** Intramaxillary anchorage, the anchor units (mandibular posterior teeth) and the teeth to be moved (maxillary canine) are present in the same arch

- **Intra-maxillary Anchorage**: is obtained from teeth in one jaw to move other teeth in same jaw.
- **Inter-maxillary Anchorage**: is obtained from teeth in one jaw to move other teeth in opposite jaw. E.g. class II elastic traction between upper anteriors to lower molar as well as class III elastic traction between lower anteriors and upper molar



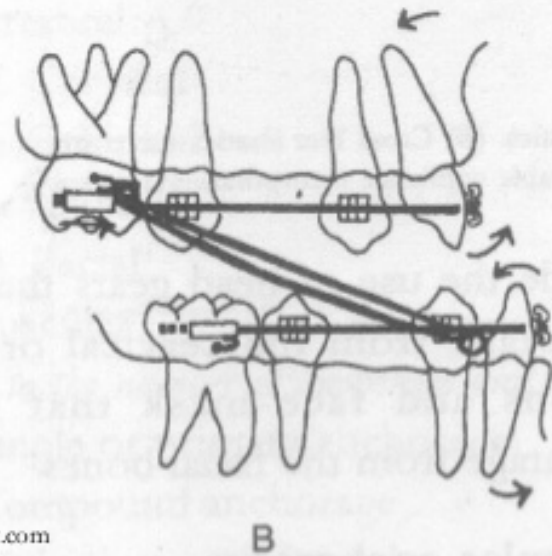
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## Class II intermaxillary elastics



## Class III intermaxillary elastics

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3- Depending on site of anchorage:

a. Intra oral

b. Extra oral

c. Muscular

1. Intra oral : Anchorage established within the mouth. (teeth, palate, alveolar bone and basal bone)

Factors affecting anchorage:

- a. Number and Size of roots (multirooted > single rooted)
- b. Shape (triangular shaped root > conical or ovoid root larger surface area > smaller surface area)
- c. Length of each root (longer rooted > shorter rooted)

- d. Inclination of tooth: A greater resistance to displacement is offered when the force exerted to move teeth is opposite to that of their axial inclination.
- e. Ankylosed teeth: such teeth are directly fixed to the alveolar bone and lack periodontal ligaments. Orthodontic tooth movement of such teeth is not possible and therefore they are excellent anchorage.

2. Extra oral : Anchorage  
obtained outside the oral cavity.

1)CRANIUM(OCCIPITAL OR  
PARIETAL ANCHORAGE:-  
ANCHORAGE OBTAINED  
FROM OCCIPITAL OR  
PARIETAL BONE .EG:-  
HEAD GEAR TO RESTRICT  
MAXILLARY GROWTH

2)CERVICAL:-ANCHORAGE  
FROM CERVICAL OR NECK  
REGION .EG:-CERVICAL  
HEAD GEAR .

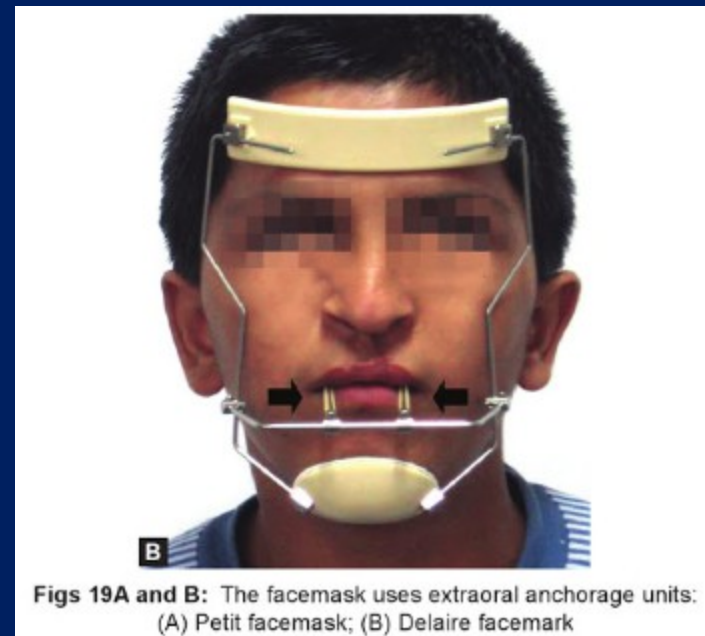


Fig. 18: Occipital headgear



Fig. 17: Cervical headgear

3) FACIAL BONES:- FACE MASK USED TO PROTRACT MAXILLA TAKE ANCHORAGE FROM MANDIBULAR SYMPHYSIS . REVERSE HEAD GEARS TAKE ANCHORAGE FROM FOR HEAD AND CHIN



Figs 19A and B: The facemask uses extraoral anchorage units:  
(A) Petit facemask; (B) Delaire facemask

## Extra oral forces to augment anchorage

### Advantage

- The anchorage unit is far away from the actual site where the movement is taking place, so less chances of any change in the anchorage units

### Disadvantage

- Lack of patient's co- operation
- Anchorage assembly is bulky & externally visible
- Decrease in the number of hours for which the anchorage assembly is worn, so affects quality of result achieved

- 3. Muscular Anchorage : Anchorage derived from action of muscles. Peri oral musculature is not so strong but also resilient. The forces generated by the musculature sometimes used to bring about tooth movement. eg. Lip bumper appliance (to distalize mandibular 1st molars)





4- Depending on no. of anchor units:

a- *Single / primary*

b- *Compound*

c- *Multiple/ reinforced*

- **Single anchorage:** a tooth of greater support in the alveolar process is used to move a tooth of lesser support. Eg. Molar being used to retract a pre molar
- **Compound anchorage:** number of teeth of greater support in the alveolar process used to move teeth of lesser support. Eg. Retracting incisors using loop mechanics



Fig. 14: Loop mechanics used to retract anteriors

- Reinforced Anchorage** :• It involves reinforcing the anchorage or resistance area either by adding more resistance units or by the use of various adjuncts.
- A simple way of reinforcing anchorage is to band the second molars.
  - Various other ways include, the use of T.P.A., Nance holding arch, lower lingual arch.
  - Tissue anchorage such as obtained by lip bumper can be efficiently used to distalize molars.
  - Prepared anchorage pre sets the teeth into disto-axial inclination, greatly increasing the irrisistance to displacement.
  - Miniscrew.



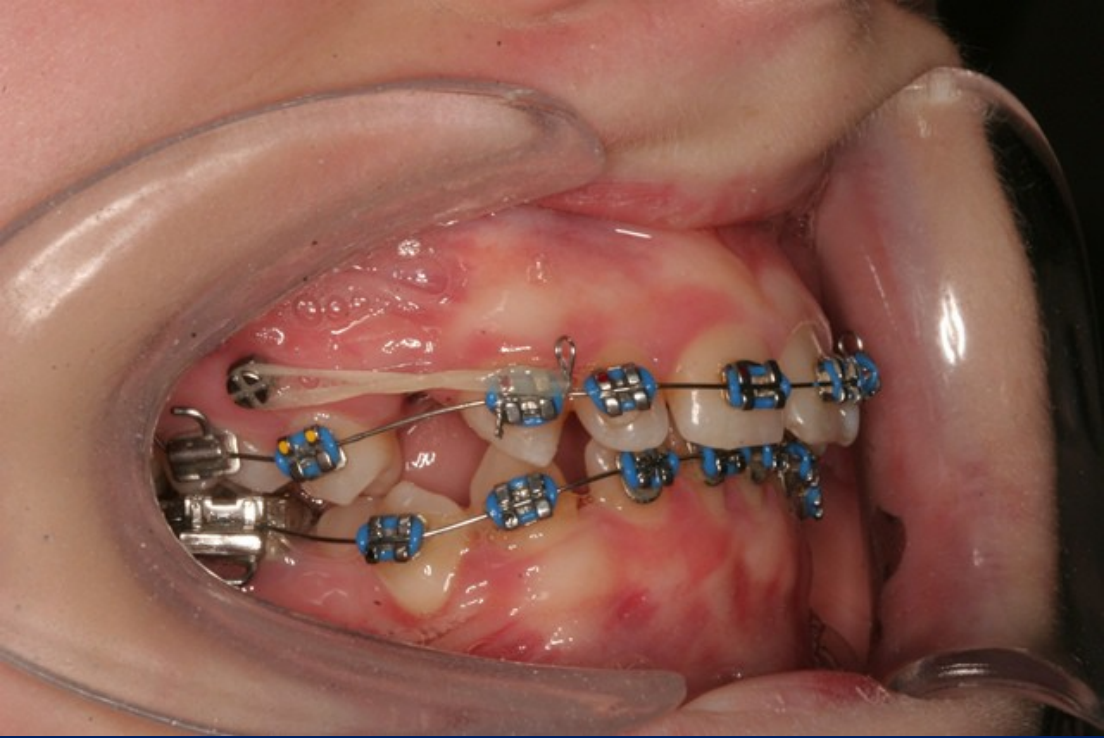
**Fig. 16:** Anchorage potential of the posterior segment is reinforced by banding the maxillary 2nd molar



**Fig. 15:** A transpalatal arch is used to reinforce anchorage



**Fig. 8:** Lip bumper makes use of the tonicity of the lip musculature and enhances the anchorage potential of the mandibular molars preventing their mesial movement



- **Cortical anchorage** :The cortical bone is more resistant to resorption than the medullary bone. The cortical anchorage concept makes use of this.

- Rickett's advocated torquing the roots of buccal teeth outwards against the cortical plate as a way to inhibit their mesial movement. Torquing movements are limited by facial and lingual cortical plates. If a root is persistently forced against the cortical plate, tooth movement is greatly slowed, root resorption is likely and eventual penetration of cortical bone may sometimes occur.

# Anchorage planning

- Its essential to assess the anchorage demand of an individual case so the appropriate treatment modalities can be executed. The anchorage requirements depend on number of factors:
  - 1- Number of teeth to be moved: the greater number of teeth to be moved, the greater is the demand on anchorage.



2- Type of teeth being move: the movement of slender anterior teeth offers less strain on anchorage than multirouted teeth

3- Type of tooth movement:

Bodily movement cause more strain on anchorage

Tipping movement cause less strain on anchorage

4- Duration of tooth movement: prolonged duration of treatment places undue strain on anchorage

# Anchorage loss

- Anchorage loss: is the unwanted movements of anchor teeth.  
According to anchorage loss that is permissible, the anchorage demand of an extraction case can be of three types:

1- maximum anchorage

In cases where the anchorage demand is very high, not more than  $\frac{1}{4}$  th of the extraction space should be lost by forward movement of the anchor teeth. The anchorage of these patients should be augmented to avoid unwanted movement of the anchor teeth

## 2- moderate anchorage

In cases, the anchor teeth can be permitted to move forward **into  $\frac{1}{4}$ th to  $\frac{1}{2}$  of the extraction space.**

## 3- minimum anchorage

In these cases, the anchorage **demand is very low. More than half** the extraction space can be lost by the anchor teeth moving mesially.