Anchorage in Orthodontic

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اعوذ بالله من الشيطان الرجيم

لَقَدْ خَلَقْنَا الْإِنْسَانَ فِي أَحْسَنِ تَقْوِيمٍ

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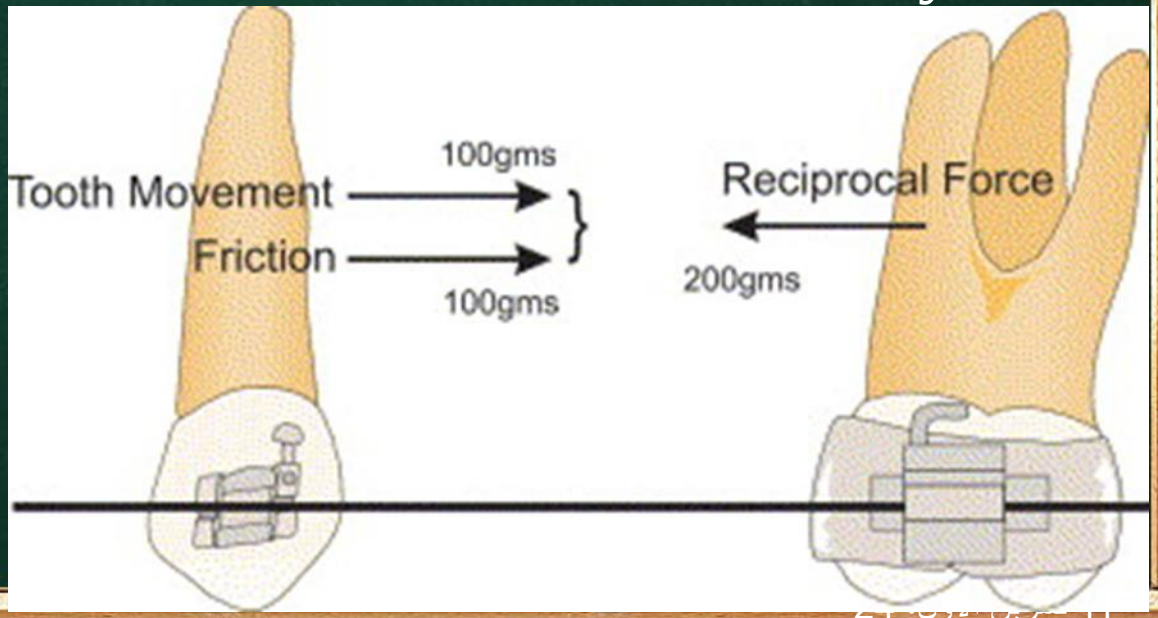
Anchorage

Tooth movement is achieved through the forces generated by an orthodontic appliance.

the force generated has an equal and opposite reactionary force, as described by Newton's Third Law "For every action, there is an equal and opposite reaction". This reactionary force which will in turn be spread over the teeth that are contacted by the appliance.



Anchorage

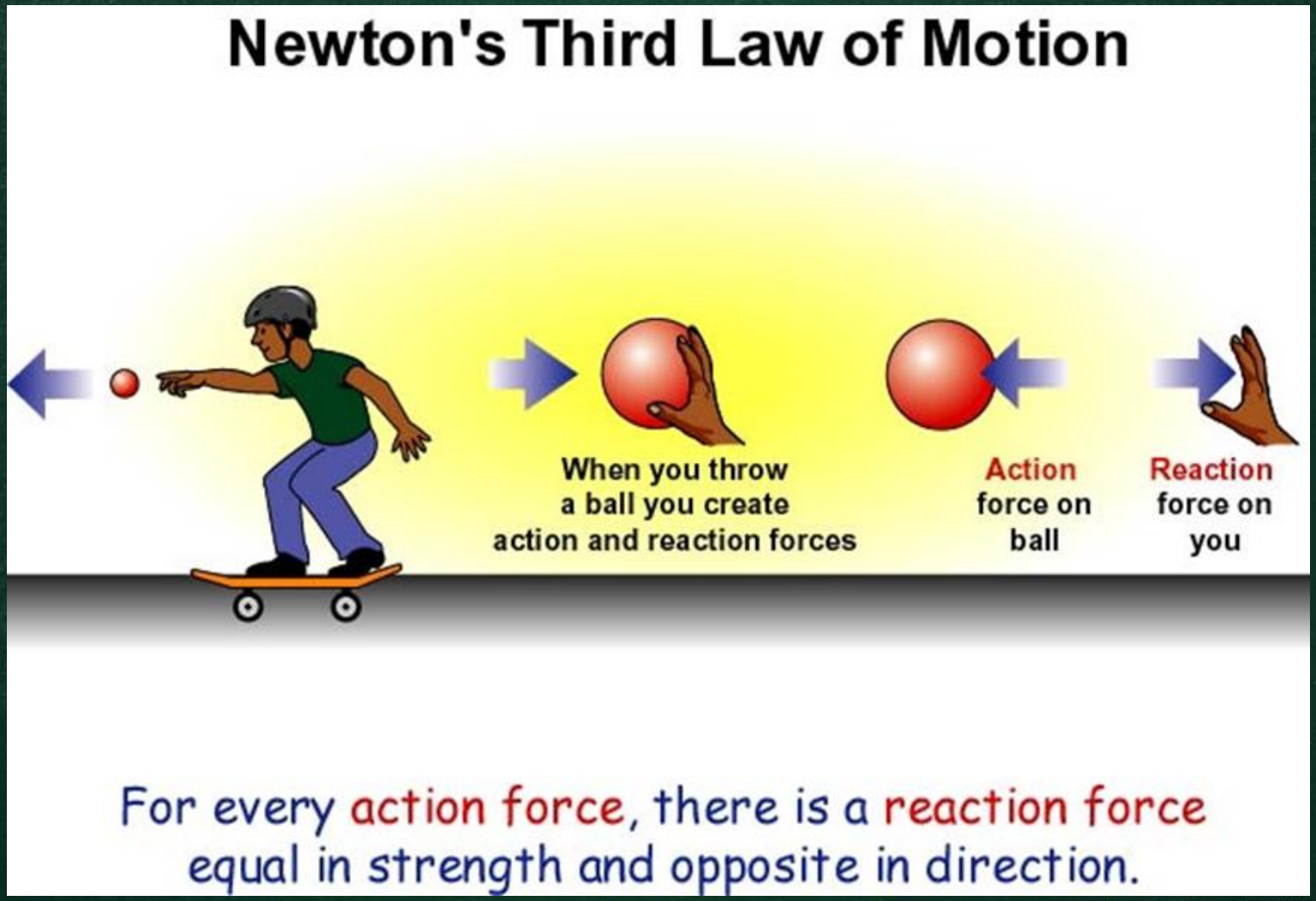
This reactionary force must be identified and dispersed so as not to produce any unwanted effect. This is done by spreading the load of the reaction over as large an area of tissue as possible so as to reduce the pressure in terms of grams per square millimeter to the smallest possible value.

Anchorage

Anchorage is defined as the resistance to unwanted tooth movement

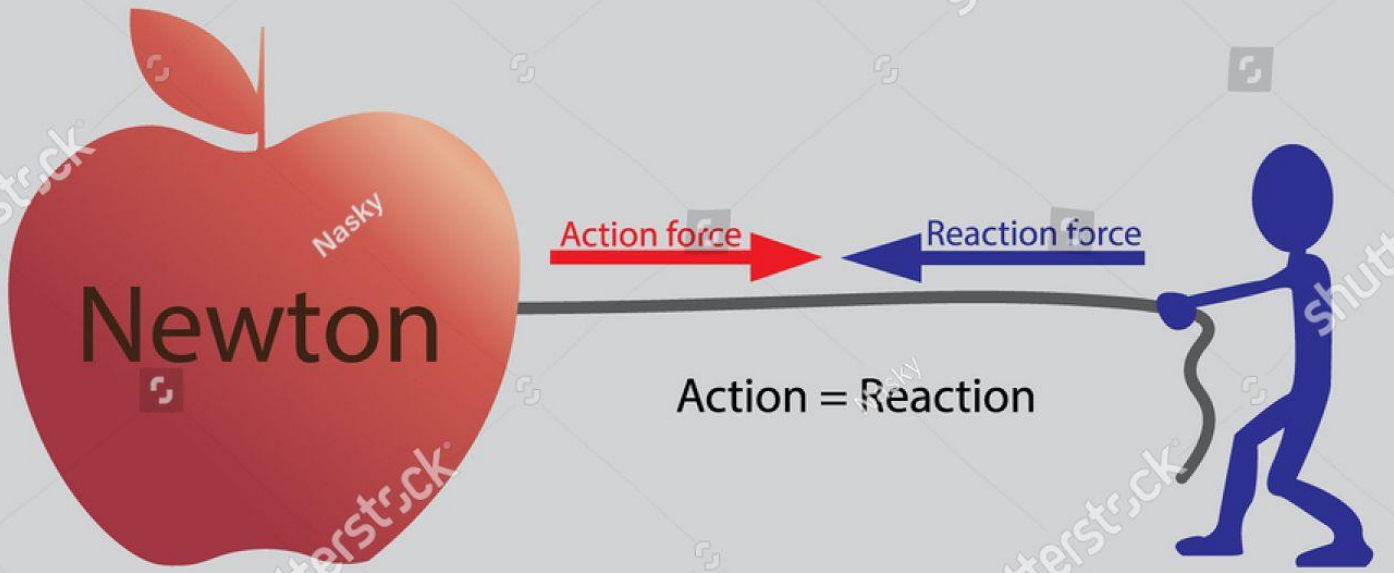
Anchorage: This is an imaginary component resisting unwanted tooth movement.

Anchorage


Newton's Third Law of Motion
When you throw a ball you create action and reaction forces
Action force on ball
Reaction force on you
For every action force, there is a reaction force equal in strength and opposite in direction.


F_2
F_1

Newton's Third Law of Motion



Anchorage

It is the anchorage support that resists these reactionary forces and prevents unwanted tooth movement.

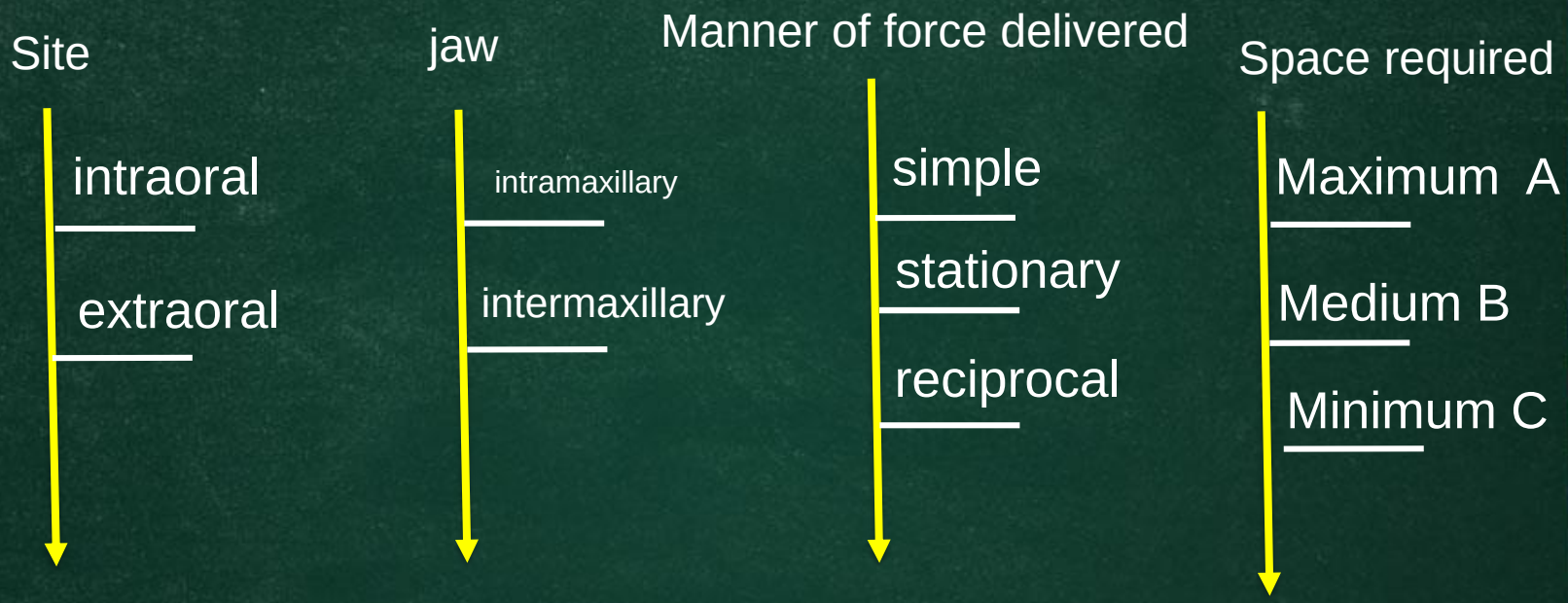
The aim of anchorage is to minimize the unwanted tooth movement and maximize the desired tooth movements

Anchorage

In orthodontics Anchorage is difficult concept and difficult to maintained. To simplify anchorage concept

This can be considered similar to pitting one larger tooth against another smaller tooth, or against two smaller teeth. The more teeth you try to move the more likely your anchorage unit will move as well

types of orthodontic anchorage



intraoral anchorage

Anchorage reinforcement can be achieved by utilizing the teeth, soft tissues and skeletal structures intra-orally

intraoral anchorage

Transpalatal arch with Nance button.

The anterior palatal vault is used as additional anchorage with the addition of an acrylic button.

intraoral anchorage

Lingual arch.

Transpalatal arch

intraoral anchorage

Intermaxillary anchorage

Anchorage from one arch can be used to reinforce anchorage in the other.

Class II intermaxillary traction (elastics)

Class III intermaxillary traction (elastics).

intraoral anchorage

Removable and functional appliances

Upper removable appliance with midline expansion screw demonstrates reciprocal anchorage.

intraoral anchorage

Temporary anchorage devices (TADs)

Temporary Anchorage Device to conserve anchorage in maximum anchorage case

(a) at commencement of space closure;

(b) 3 months later.

intraoral anchorage

Temporary anchorage devices (TADs)

Osseointegrated midpalatal implant used in conjunction with transpalatal arch to achieve absolute anchorage.

A and B) For this patient, a goal of treatment was closure of the space where mandibular second premolars were missing by bringing the mandibular molars forward, with more movement needed on the right side. (C) A bone screw was placed in the dentoalveolar process between the right central and lateral incisors, and those teeth were stabilized by tying them to the archwire (indirect anchorage), and then the spaces were closed with sliding mechanics (D and E). (Courtesy Dr. N. Scheffler.)

Extra-oral anchorage

Headgear

Is an extraoral appliance use the concept of extraoral force, of using an area outside the mouth.

Extra-oral anchorage holds the posterior teeth in position, preventing unwanted mesial movement of the anchorage unit.

Headgear

Headgear anchorage. (A) Occlusal and (B) lateral view of a headgear with a force of about 400 g and a direction corresponding to medium pull.

Feldmann and Bondemark, 2015

Headgear

The amount of force

The amount of force applied to the headgear is controlled by adjusting the attachment straps and can and should be carefully monitored at each visit.

For orthodontic change it is normal to apply 250–350 g to achieve anchorage reinforcement,

Headgear

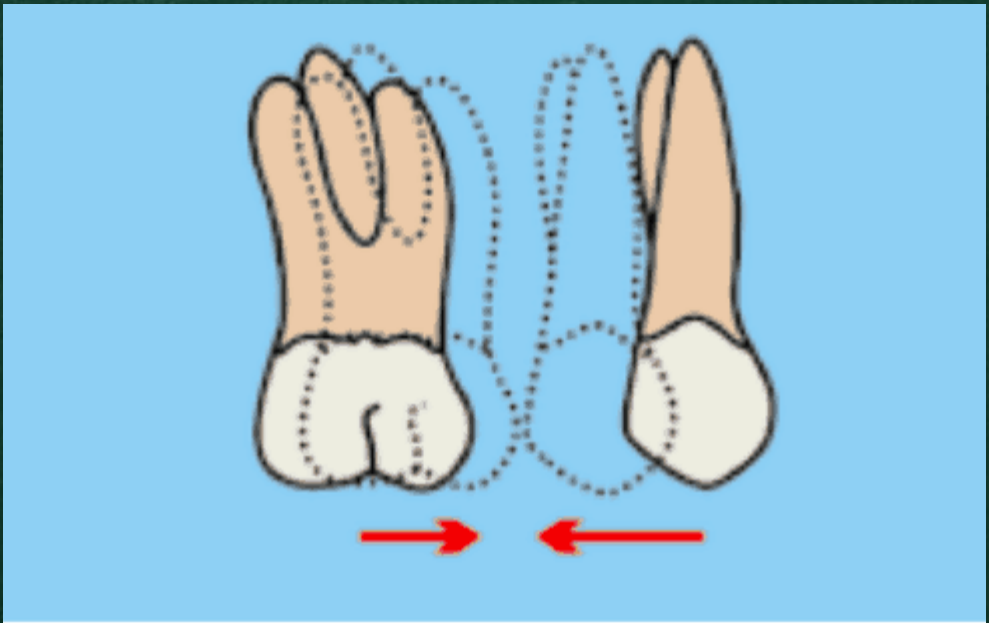
The duration of force

The duration of force also varies according to the purpose. Extraoral anchorage requires a minimum of 10 hours per day, usually best achieved at bedtime.

. Classification of anchorage

Simple anchorage

one tooth against another



. Classification of anchorage

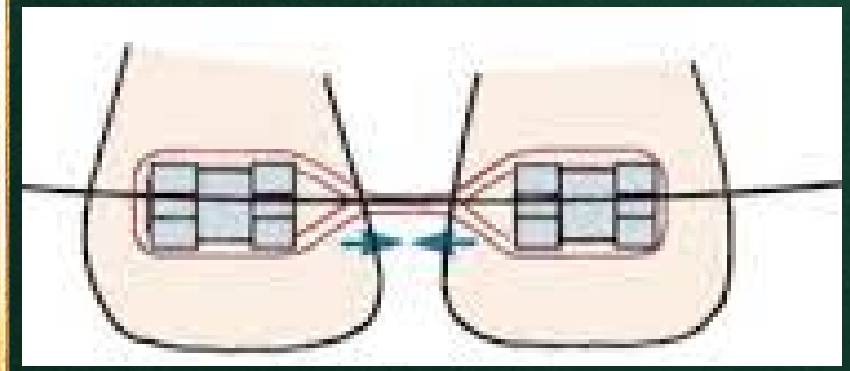
Stationary/absolute anchorage

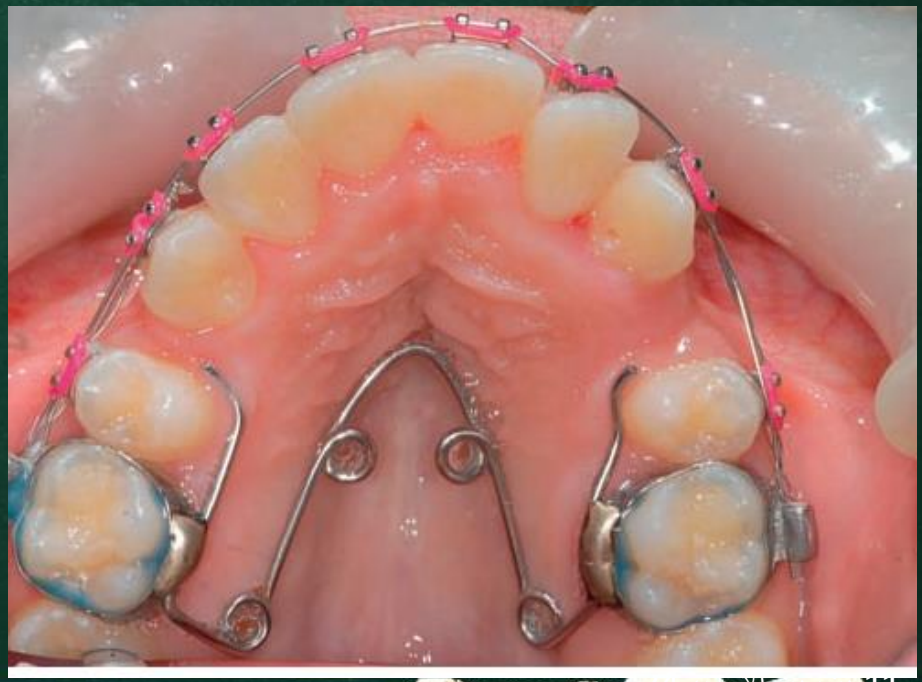
this can only be achieved when using an osseintegrated implant or ankylosed tooth as an anchorage unit

. Classification of anchorage

Reciprocal anchorage

two groups of teeth of equal size or equivalent anchorage value are pitted against each other, resulting inmovement of both units. For example, a quadhelix used to expand the maxillary arch. or applying power chain on an upper fixed appliance to two central incisors across a diastema





. Classification of anchorage

Intramaxillary compound anchorage

multiple teeth are used in an anchorage unit in the same arch, for example using a molar and a second premolar as an anchorage unit for retraction of a canine

Assessing anchorage requirements Planning anchorage

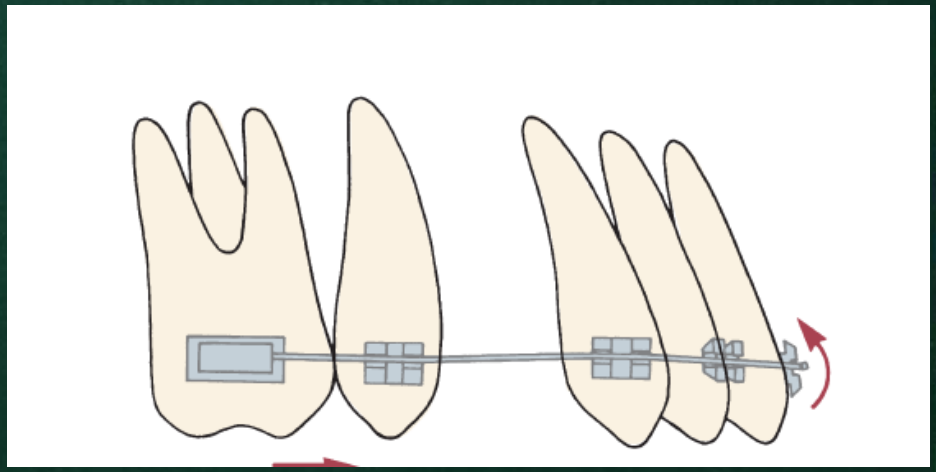
Anchorage requirements should be considered in three dimensions anteroposteriorly, vertically and transversely. Planning anchorage is a fundamental part of treatment planning

Assessing anchorage requirements

When considering anchorage management it is important to assess the following

1- Space requirements

Maximum anchorage support is required when all or most of the space created, most commonly through tooth extraction, is required in order to achieve the desired tooth movements.



Assessing anchorage requirements

2- The type of tooth movement to be achieved

Bodily movement requires more force than tipping movements and is therefore more anchorage demanding

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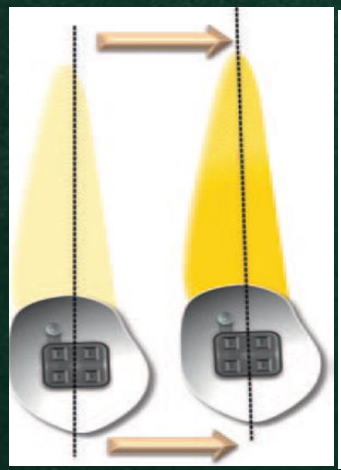

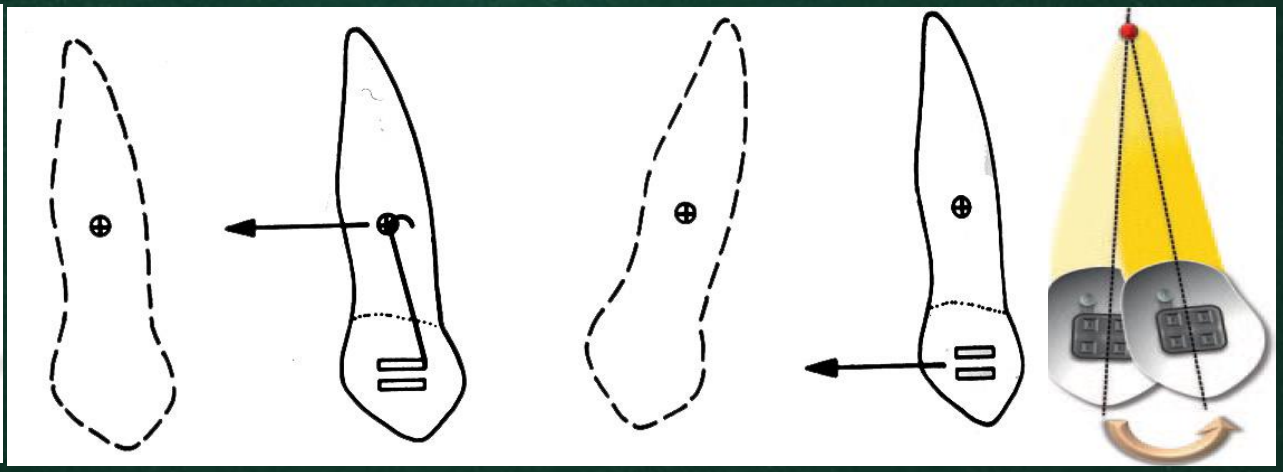

Assessing anchorage requirements

3- The number of teeth to be moved

As the number of teeth to be moved increases so does the anchorage demand

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Miniplate with connection serves as anchorage to move the premolars and molars to the distal with a coil spring *(Cornelis et al., 2008).*

Assessing anchorage requirements

4- The distance of the movement required

The greater the distance the teeth are to be moved, the greater the strain on the anchorage, and the greater the risk of unwanted tooth movement

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Assessing anchorage requirements

5- Aims of treatment

The aims of treatment should be clear. In cases with a Class II molar relationship, anchorage needs will be greater if a Class I molar (and canine) relationship is to be achieved rather than a Class II molar (and Class I canine) relationship.

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Assessing anchorage requirements

6- Root surface area of the teeth to be moved

the larger the root surface area the greater the demand

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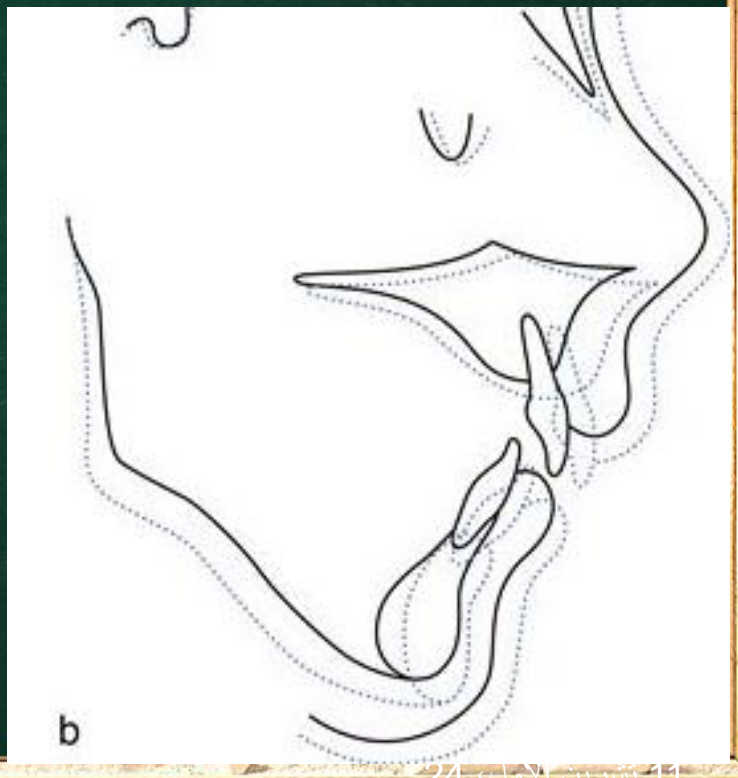
Assessing anchorage requirements

7- Growth rotation and skeletal pattern

An increased rate of tooth movement has been associated with patients who have an increased vertical dimension or backward growth rotation.

It has been suggested that space closure or anchorage loss may occur more rapidly in these high angled cases.



Assessing anchorage requirements

7- Growth rotation and skeletal pattern

Conversely in a patient with reduced vertical dimensions or a forward growth rotation, space loss or anchorage loss may be slower. A possible explanation that has been proposed for this observation is the relative strength of the facial muscles, with reduced vertical dimensions having a stronger musculature

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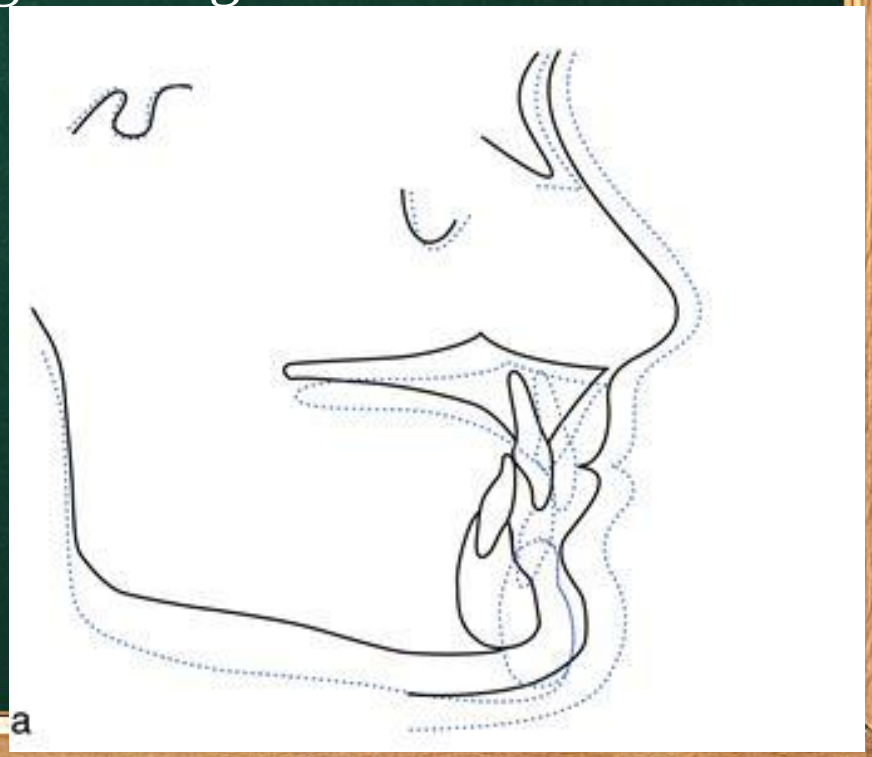

Assessing anchorage requirements

8- Occlusal interdigitation and occlusal interferences

Occlusal interdigitation or occlusal interferences can prevent or slow tooth movement, this in turn can increase the anchorage demand


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Thank You

ANY QUESTION?