Anchorage

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Objectives

* What is anchorage?
* Classification of anchorage.
* What is loss of anchorage?
Anchorage is a resistance to unwanted tooth movement.

The aim of anchorage is to minimize the unwanted tooth movement and maximize the desired tooth movements.
Anchorage requirements should be considered in three dimensions, anteroposteriorly, vertically and transversely.

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 is required to correct the crowded teeth.

More crowding → more anchorage
2- The type of tooth movement to be achieved:

* Tipping occurs when the crown of a tooth moves in one direction and the root moves by in the opposite direction.
* Bodily movement occurs when both the crown and the root move in the same direction

Bodily movement → more anchorage
3. The number of teeth to be moved:

* As the number of teeth to be moved increases so more anchorage need.

4. The distance of the movement required:

* The greater the distance the teeth are to be moved, the greater anchorage need.
5. Aims of treatment:

* 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.
6. **Root surface area of the teeth to be moved:**

* The large root surface area giving you more anchorage.
7. Occlusal interdigitation and occlusal interferences:

* Occlusal interferences can prevent or slow tooth movement.

8. Bone quality:

* Maxillary bone is less dense than mandibular bone, so anchorage loss is more rapid in the maxillary arch.
1. Intra oral anchorage

A. Simple anchorage:
   One tooth against another.

B. Intramaxillary compound anchorage:
   Multiple teeth are used in an anchorage unit in the same arch.
C. Intermaxillary compound anchorage:

Multiple teeth in opposing arches, like intermaxillary elastics.
D. Reciprocal anchorage:

Two groups of teeth of equal size are pitted against each other, resulting in movement of both units, like quadhelix, cross elastics.
E. **Stationary/absolute anchorage:**

This can only be achieved when using an osseointegrated implant
Classification of anchorage

2. Extra oral anchorage

A. Headgear

B. Face mask (reverse headgear)
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Reinforcement of Intra oral anchorage

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

Increasing the number of teeth in the anchorage unit:

Using as many teeth as possible into an anchorage unit will aid in increasing anchorage, and decreasing the unwanted tooth movement.
Differential extraction pattern:

Extracting teeth closer to the site of crowding reduces the amount of tooth movement required and the risk of anchorage loss.
Care with initial intra-arch orthodontic mechanics:

Engagement of severely displaced teeth in the early stages of alignment may increase anchorage loss.
Bodily movement of teeth:

* Bodily movement requires more force than tipping movements and is therefore more anchorage need.

* Use of large rectangular stain-less steel arch wires will ensure bodily movement.
Transpalatal, Nance and lingual arches:

* They are linking contralateral molar teeth.
* Joined with an arch bar, usually 1 mm diameter stain-less steel.
* When connects across the vault of the palate (transpalatal arch).
* When contacts the anterior palatal mucosa (NANCE appliance).
* Around the lingual aspect of the lower arch (lingual arch)
* They are using the basal bone to augment the anchorage
Intermaxillary anchorage:

* Anchorage from one arch can be used to reinforce anchorage in the other.
* Class II elastics will be run anteriorly in the upper arch to posteriorly in the lower.
Class III elastics are run anteriorly in the lower to posteriorly in the upper
Removable and functional appliances:

* They increase anchorage by their palatal coverage

* Can be used alone or to reinforce anchorage in conjunction with a fixed appliance

* Anteroposteriorly inclined bite-blocks

* Transversely expansion screw

* Vertically bite-plane
Temporary anchorage devices (TADs)

Also known as orthodontic bone anchorage devices

They classified to:

1. Mechanical retention
   a. Screw design
   b. Plate design

2. Osseointegration
Screw design or miniscrews

* No osseointegration is required.
* They are small in size.
* Ease to use.
* The head and neck configuration has been adapted to facilitate placement of auxiliaries to the fixed appliance.
* Can usually be removed without anaesthesia.
They can provide anchorage either

Direct anchorage: is achieved when forces are applied directly to the TAD.

Indirect anchorage: is achieved when the TAD is linked to the anchorage teeth, and then the orthodontic forces are applied to this anchorage unit.
Direct anchorage
Plate design or Miniplate systems

* These are based on maxillofacial bone plates, with a transmucosal portion projecting into the mouth to allow connection to the fixed appliance.
* They can provide good anchorage.
* Require a surgical procedure to place them and remove them.
Osseointegrated implants

* They are shorter and wider diameter than those used in restorative dentistry.

* They provide Stationary or absolute anchorage.

* useful if large or difficult tooth movements are required.
* They need to be left for 3 months after placement to allow osseointegration.

* Due to their size they are restricted to being used in edentulous areas.

* Requires a complex surgical procedure with bone removal at the completion of treatment.
2. Extra oral anchorage

A. Headgear

Headgear can be used for:

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

* Extra-oral traction applies a distal force to the posterior teeth to achieve tooth movement in a distal direction, and to restrict the growth of the maxilla.
Cervical - pull

High - pull
B. Face mask (Reverse headgear)

A face-mask or reverse headgear has two uses.

* Tooth movement: moving the posterior maxillary teeth mesially.

* Skeletal changes: advancement of the maxilla can be achieved in patients with CLIll malocclusion.
Loss of anchorage

Undesirable movement and failure to achieve correction of a malocclusion (movement of anchor unit).

Due to:

* Failure to correctly plan anchorage requirements at the start of treatment.
* Repeated breakages of anchorage devices.
* Failure to wear intermaxillary elastics.
* Patient compliance specially with extra oral devices.
Loss of anchorage

Signs of anchorage loss:

* Tipping of anchor teeth.
* Closure of extraction space by movement of another teeth.
* Proclination of anterior teeth.
* Increase in over jet.
* Change in molar relation.
Case for discussion
THANK YOU FOR YOUR KIND ATTENTION