A to Z ORTHODONTICS

Volume: 04

ANCHORAGE

Dr. Mohammad Khursheed Alam
BDS, PGT, PhD (Japan)

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Anchorage

Graber has defined anchorage in orthodontics as the nature and degree of resistance to displacement offered by an anatomic unit for the purpose of effecting tooth movement.

White & Gardener - “Anchorage is the site of delivery from which a force is exerted.”

* Tooth movement during orthodontic therapy is brought about forces generated by active component of an orthodontic appliance. The force is used to move the teeth are derived from certain anatomic areas which act is anchorage.

Classification:

(A) According to manner of force application:

(1) Simple anchorage.

(2) Stationary anchorage.

(3) Reciprocal anchorage.

(B) According to jaws involved:

(1) Intra maxillary.

(2) Inter maxillary.

(C) According to the site of anchorage:
(1) Intra oral.

(2) Extra oral ➔ A) Cervical.

(3) Muscular.       B) Occipital
                   C) Cranial
                   D) Facial.

(D) According to the number of anchorage units:

(1) Single or primary anchorage.

(2) Compound anchorage.

(3) Multiple or reinforced anchorage.

(E) Depends on anchorage loss:

(1) Maximum anchorage (Type A anchorage)
A situation in which the treatment objectives require that no or very little
anchorage can be lost.

(2) Moderate anchorage (Type B anchorage)
A situation in which anchorage is not critical and space closure should be
performed by reciprocal movement of both the active and the anchorage
segment.

(3) Minimum anchorage (Type C anchorage)
A situation in which, for an optimal result, a considerable movement of the anchorage segment (anchorage "loss") is desirable, during closure of space.

**Source of anchorage**

During orthodontic therapy it is mainly obtained from two sources:

1. Intraoral source
2. Extraoral source

**Intraoral source:** The intraoral sources of anchorage include the teeth, alveolar bone, the basal jaw bone, the musculature.

The teeth themselves can resist movement. The anchorage potential of teeth depends on a member of factors such as root form, root size, no of roots, root length, and root inclination.

**Root form:** On cross section of roots can be of three types, round, flat and triangular.

Round roots as seen in bi cuspids and palatal root of maxillary molars can resist horizontally directed forces in any direction.

Flat roots for an example those of mandibular incisors and molars and buccal roots of maxillary molar can resist movements in mesio-distal direction.
Triangular roots of canine and maxillary central and lateral incisor offer the maximum resistance to displacement compared to round or flat root form.

**Size and no of root:** Multi rooted with large root have a greater ability to withstand stress than single rooted teeth.

**Root length:** The longer the root the deeper it is embedded in bone and the greater is its resistance to displacement.

**Inclination of tooth:** The greater resistance to displacement is offered when the course exerted to move teeth is opposite to that of their axial inclination.

**Ankylosed teeth:** Orthodontic movement of such teeth is not possible and they can therefore serve as excellent anchors whenever possible.

**Alveolar bone:** When the force applied exceed a certain limit, the alveolar bone permits tooth movement by bone remodeling.

**Basal bone:** The areas include the hard palate and the lingual surfaces of the mandible in the region of the roots of basal bones are available intraorally as source of anchorage.

**Musculature:** Muscle causes flaring and spacing of teeth. Hypertonic muscles cause collapse of the teeth lingually.

**Extraoral anchorage**
Certain extra oral areas can also be used when adequate resistance cannot be obtained from intra oral sources for the purpose of anchorage. The extra oral sources of anchorage include.

1. the cranium
2. the back of the neck
3. the facial bones

**Cranium (occipital / parietal anchorage)**

Using head gears that derive anchorage from the occipital or parietal region of the cranium. These devices are used along with a face bow to restrict maxillary growth or to move the dentition or maxillary bone distally.

**Back of the neck (cervical anchorage):**

Extra oral anchorage can alternatively be obtained from the neck or cervical region. Such a type of head gear is called cervical head gear,

**Facial bones:**

The frontal bone and the mandibles symphysis offer anchorage during face mask therapy in order to protract the maxilla. A maxillary head gear that makes use of anchorage from the forehead and chin are called reverse headgears.

**Description of different types of anchorage**

1. Single/Simple
(A) Simple Anchorage: when a tooth with a longer root area is used to move another tooth with a smaller root area in the same dental arch

(B) Compound simple: when a greater number of teeth are used to move a smaller number of teeth in the same dental arch

2. Stationary anchorage: This is a compound anchorage where the teeth only can move bodily to resist anchorage.

3. Reciprocal Anchorage

The anchorage is said to be reciprocal in those case where it is designed that two teeth or low groups of teeth shall move to an equal extent towards each other or in opposite direction.

It is necessary that each group should offer equal resistance lest, the movement will be unequal.

Example: (1) Dental arch expansion. [Upper expansion plate]

(2) Pin & tube appliance to approximate $\frac{1}{1}$.

(3) Closure of midline diastema.

(4) Use of cross bite elastics.

(5) Correction of single tooth crossbite.

Intramaxillary anchorage: Anchorage obtained from a tooth/teeth in one jaw to move the tooth/teeth in the same jaw, It may be simple (single / compound), re-inforced or reciprocal.
**Intermaxillary anchorage:** where the teeth in one arch are used for anchorage to move the teeth in other arch.

**Causes of loss of anchorage:**

1. Not wearing the appliance adequate
2. Too much activation of springs or active components
3. Presence of acrylic or any obstruction on the path of tooth movement
4. Poor retention of appliance.
5. Anterior bite plane: as this withdraws the occlusal interlock,
6. Anchor root area, not sufficiently greater, then the root area of tooth or teeth to be used,
7. If appliance encourage tipping movement of anchor teeth and bodily movement of the teeth to be moved.

**Means to detect anchorage loss**

1. Position of another teeth, in relation to the teeth in the same and opposite arch.
2. Increase in overjet.
3. Fit of the appliance in the mouth.
4. Measurements of the distance of anchor teeth from midline.
5. Measurements from palatal rugae and frenum.
6. Observation of the spacing mesial/distal to the anchor teeth.
7. Inclination of the anchor teeth.
8. Radiological examination.

**Means to increase anchorage value:**

1. Intermaxillary traction.
2. Inclined anterior bite plane.
4. Toe in & “Tip back” bends [Anchor bends for posterior anchorage] and “Apical torque” [for anterior anchorage] on arch wire so that anchor teeth can only move bodily.
5. Banding or using good number of teeth for anchorage or moving small number of tooth at a time.
6. Use of palatal and lingual arches.
7. Use of vertical springs on anchor teeth to encourage bodily movement only.

**Anchorage loss and signs**

Anchorage loss is the movement of the reaction unit or the anchor unit instead of the teeth to be moved.

Signs:

1. Mesial movement of molars.
2. Closure of extraction space by movement of posterior teeth.


4. Spacing of teeth.

5. Increase in overjet.

6. Change in molar relations.


Anchorage preparation

A procedure commonly used in the Tweed technique, during which the molars and premolars are tipped distally prior to retraction of the anterior teeth. The theory behind it is that it increases the anchorage value of the posterior segments, allowing further retraction of the canines and incisors with less anchorage loss.

ADVANCEMENT IN ANCHORAGE

Skeletal anchorage: Micro implant / TAD / Screw implant
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Dedicated To

My Mom, Zubaida Shaheen
My Dad, Md. Islam
&
My Only Son
Mohammad Sharjil
Acknowledgments

I wish to acknowledge the expertise and efforts of the various teachers for their help and inspiration:

1. Prof. Iida Junichiro – Chairman, Dept. of Orthodontics, Hokkaido University, Japan.
3. Asst. Prof. Kajii Takashi – Dept. of Orthodontics, Hokkaido University, Japan.
8. Prof. Amirul Islam – Principal, Bangladesh Dental college
9. Prof. Emadul Haq – Principal City Dental college
11. Asso. Prof. Lamiya Chowdhury – Chairman, Dept. of Orthodontics, Sapporo Dental College, Dhaka.
13. Asso. Prof. MA Sikder – Chairman, Dept. of Orthodontics, University Dental College, Dhaka.
Dr. Mohammad Khursheed Alam has obtained his PhD degree in Orthodontics from Japan in 2008. He worked as Asst. Professor and Head, Orthodontics department, Bangladesh Dental College for 3 years. At the same time he worked as consultant Orthodontist in the Dental office named “Sapporo Dental square”. Since then he has worked in several international projects in the field of Orthodontics. He is the author of more than 50 articles published in reputed journals. He is now working as Senior lecturer in Orthodontic unit, School of Dental Science, Universiti Sains Malaysia.

Volume of this Book has been reviewed by:

Dr. Kathiravan Purmal
BDS (Malaya), DGDP (UK), MFDSRCS (London), MOrth (Malaya), MOrth RCS( Edin), FRACPS.
School of Dental Science, Universiti Sains Malaysia.

Dr Kathiravan Purmal graduated from University Malaya 1993. He has been in private practice for almost 20 years. He is the first locally trained orthodontist in Malaysia with international qualification. He has undergone extensive training in the field of oral and maxillofacial surgery and general dentistry.