

Orthodontic Appliances

Generally the orthodontic appliances classified into:

A-Active: Producing tooth movement .

- 1- Removable Orthodontic appliances.
- 2- Fixed orthodontic appliances.
- 3- Combination of Removable and Fixed appliances.
- 4- Myofunctional appliances.

B-Passive: Has no active components.

- 1-Retainers.
- 2- Space maintainers.
- 3- Habit breakers.

REMOVABLE ORTHODONTIC APPLIANCE (ROA)

definition

Are appliances that used to correct simple orthodontic cases, such appliances can be removed and reinserted into the patient mouth by the dentist and the patient himself.

Action removable orthodontic appliance:

- 1- Tooth rotation less than 90° (couple force system)
- 2- Tipping tooth movement.(Labio-lingual or mesio-distal)

Indication

1. Limited (tipping) tooth movement.
2. It may be used for space maintenance or habit breaking .
- 3- Correction of individual tooth malposition.
- 4- Expansion of dental arch.
- 5- Retention after active orthodontic treatment.

Contraindications

- 1- Skeletal discrepancy.

- 2- Apical malposition.
- 3- Bodily movement.
- 4- Space problem (sever crowding or spacing).

Advantages

- 1- More hygienic than fixed.
- 2- Inexpensive.
- 3- Easy to make and adjust.
- 4- Initially less chair time.
- 5- It can be removed on socially sensitive occasions .

Disadvantages

- 1- Totally cooperation dependant !!!.
- 2- Limited to less complex movement.
- 3- Limited range of movement (few teeth move).
- 4- Uncomfortable to the patient.

Components of ROA Removable orthodontic appliances

They have 4 main components:

- 1.Active components:** which produce force for tooth movement, as springs
- 2.Retentive components:** responsible for holding the appliance inside the mouth, as clasps.
- 3.Acrylic base plate:** as a major connector connecting the components.
- 4. Anchorage.**

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

So we increase anchorage by:

- 1- full extension of the acrylic to engage many teeth .
- 2- many retentive components (adams clasp and fitted labial arch) to adapt the acrylic to the teeth and palate.

Acrylic Base Plate

Definition:

That part of ROA into which the active and retentive components are embedded

Construction:

Either from hot or cold cure acrylic resin

Thickness:

It make as wax sheet thickness 2-3 mm

Extension:

It extend to be closely fit around the neck of teeth as large no. as possible (those not to be moved), it's better not to extend distally to area of second molars to be well tolerated.

Color:

Different colors are provided by the manufactures to be acceptable by the patient especially the children.

Functions:

- 1- Stabilize other components: into which retentive and active components are embedded .
- 2- Aesthetic :replace missing tooth (in some cases).
- 3- Protect springs (boxing).
- 4- Anchorage.
- 5- As active component in some cases (anterior or posterior bite plane).

It contribute in the preservation of anchorage through two ways:

- a. Close fit of the acrylic around the neck of the teeth especially those which carry the clasps.
- b. Contact of the appliance with mucosa of the vault of palate especially those part which has vertical inclination.

As Active Component

The base plate may be thickened or extended locally to form bite planes which will have an active effect on tooth position.

1- Anterior Bite Plane

2- Posterior Bite Plane

1- Anterior Bite Plane

Thickened platform of acrylic, palatal to the upper incisors , on which lower incisors can occlude leaving the posterior teeth out of occlusion for 1-2 mm for all teeth & (for right and left side) , and the lower incisors touch the base plate uniformly at the same time.

Clinical application:

Increased incisal over bite in a typical Cl. II malocclusion

Anterior Bite Plane Should:

- 1- Touch the anterior teeth uniformly.
- 2- Flat (if sloped).
- 3- Extend from upper left lateral to the upper right lateral incisor.
- 4- Thick enough to take the posterior teeth out of occlusion about 1 - 2 mm.

2- Posterior Bite Plane

A base plate which cover the occlusal surfaces of the posterior teeth bilaterally.

- 1- Add to upper or lower.
- 2- Cover the occlusal surface of 3, 4, 5 & 6.
- 3- Thick enough just to leave the incisors out of contact.
- 4- Either flat or with indentation of opposing teeth.

Clinical application:

1. Incisor cross bite.
2. Buccolingual correction.

Retentive Components

Those component by their action the appliance stay in the mouth (prevent the dislodgement).

Advantages of Retention:

- 1- Mechanical efficiency of active component.
- 2- More acceptable by the patient.
- 3- Extra oral traction may be added without risk of displacement.
- 4- Minimize breakage of springs & clasps.

Types of Retentive Components

Adams' clasp.

Single Arrowhead Clasp.

Incisors Clasps:

- Short Fitted Wire.
- Long Fitted Wire.
- Long Labial Bow.

Miscellaneous Clasps:

- Ball clasp
- C- clasp..

Adams' clasp:

Description: (Two arrowheads connected by bridge) Clinical Application

Single clasp of 0.7 mm used on 6 or 3.

Double clasps of 0.7 mm used on 4 & 5 or 1&1.

Single clasp of 0.6 mm used on C.

Double clasps of 0.6 mm used on D&E.

Single Arrowhead Clasp:

Clinical Application

- Lower appliance which already of poor retention. **Advantages:**
- Accurate positioning.
- Adjustment is easy.

- Absence of bridge.
- Good adaptation.

Incisors Clasps

-Short fitted wire(0.7 mm used on 1&1). without arrowheads.

Sometime bilateral loops may add for further adjustment).

Clinical Application and Advantages:

- Proclined incisors.
- Midline diastema.

-Long Fitted Wire

As short fitted wire lies on midway of labial surfaces but it involves (1,1,2&2)

-Long Labial Bow

It aids in:

- 1- Retraction of incisors following canine retraction where its flexible due to incorporation of bilateral U- shape loops,
- 2- Static anchorage against protraction of retruded incisors)

Miscellaneous Clasps:

-Ball Clasp: it has ball shape end , fabrication is easy but because of their short span it relatively stiff & unable to extend deeply into the undercut as an Adams clasp.

-Circumferential Clasp or C-clasp : c-shape clasp especially used for second molar & occasionally for canine, although its main advantage less occlusal interference than Adams clasp, it offer poor retentive ability than the later.

ACTIVE COMPONENTS

Those components which exert the force that produce tooth movements.

TYPES OF ACTIVE COMPONENTS

- 1- Springs
- 2- Elastics

3- Screws

Springs

Mechanical Principles:

1- The force should be delivered at right angles to the long axis of the tooth.

Failure: vertical component of force tend to displace springs.

2- As far as possible the force should be applied through a surface which is parallel to the long axis of the tooth.

Failure: tend to displace springs & intrude the tooth.

3- The force should pass through the center of resistance of the tooth (approximately the center of tooth viewed in cross section).

Failure: tendency for the tooth to rotate.

Classification:

- 1- Spring for mesiodistal movement.
- 2- Spring for buccal movement.
- 3- Spring for lingual movement.
- 4- Spring for overjet reduction & alignment incisors.
- 5- Spring for arch expansion.

Spring for mesiodistal movement.

Palatal finger spring.

Buccal canine retractor.

Spring for buccal movement.

Cranked Palatal Spring.

Z-spring & double Z-spring.

T-spring.

Spring for lingual movement.

Molar Spring

Canine & Premolar spring

Single Incisor spring

Spring for overjet reduction & alignment incisors

Labial bow with small loops

Labial bow with large loops

Roberts Retractor

Spring for Arch Expansion

The Coffin Spring:

Elastics

Elastic traction

Intramaxillary Traction

Intermaxillary Traction

Screws

Types :

A- jack screw :which is the most commonly used it consist of two halves threaded central cylinder, turned by means of a key which separates the two halves by a distance usually about 0.2 mm each quarter turn .

B- piston –screw :activated by moving the screw assembly forward by screwdriver

Indications:

1- Expansion .

A- Anterior expansion

B- transverse expansion