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FUNCTIONAL ORTHODONTIC APPLIANCES

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BDS, PGT, PhD (Japan)

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Myofunctional Appliance

Definition:

A functional appliance harnesses the natural forces and transmits it to the teeth and alveolar bone in a pre determined direction.

Myofunctional appliance is a removable type of appliance where the appliance becomes active by muscle force.

Feature: This is orthopaedic in nature. This appliance is an oral screen. Loosely fitted in the oral cavity.

Synonyms:

- a) Monoblock - as myofunctional appliance has joined both upper and lower bases plates.
- b) Activator (More popular) - As activates the musculature.
- c) Anderson- As initially applied by the Anderson.
- d) Frankel appliance or Functional regulator
- e) Norwegian appliance

Purpose: It is mainly used for correction of skeletal discrepancy (basal bone/ arch relationship) and to some extent dental anomalies.

How does it work?

It works by muscle force and act on the T.M joint area in the condylar head

& fossa by giving stimulation on bone forming cell.

Age limitation:

From 8 to 12 years that is growing and mixed dentition stage.

If the age does not permit the change will not occur and there will be TM joint pain, muscle will be fatigue.

Contraindication:

1. Severe crowding.
2. If the mandible could not move forward or backward.
3. If who are mouth breather.
4. Uncooperative patient.

Prognosis time: Depends on patient cooperation used on growing stage
-12 to 18 hrs daily 6 months to 1 year is required for improvement.

CLINICAL & LABORATORY ASPECT OF MYOFUNCTIONAL APPLIANCE (MFA)

- ✚ Functional analysis
- ✚ Diagnosis
- ✚ Adoptive bite registration
- ✚ Articulation
- ✚ Wire frame work
- ✚ Wax pattern
- ✚ Fabrication of appliance
- ✚ Trimming/Polishing
- ✚ Insertion
- ✚ Selective Trimming and adding of resin.

Advantage:

- (1) Used to make the Pt fit for weaning the fixed appliances
- (2) MFA has no interfering effect among the erupting teeth as used in early stage.

Caution: Before eruption of premolar & canine we cannot use the fixed appliance.

(1) Functional Analysis: It is mainly Cephalometric analysis - How far the maxilla & mandible is advanced & what is the relation between them. SNA angle.

(2) Diagnosis: In case of class II malocclusion if the lower jaw can be bring forward there will be change of muscular orientation and by this bite can be adapt in class II malocclusion.

(3) Adaptive Bite Registration: By using modeling wax sheet (5 -10 mm thick) in pt's mouth. Bite should be repeated for several times (3 time).

Result - At the end of the treatment procedure proper intercuspation of teeth should be obtained otherwise there will be complication in later stage e.g. Pain and other complication.

In plaster model the wax bite should be replaced then after examining the model pt's mouth should be checked again.

It should be coincide

(4) Articulation of the Model: Along with constructed bite models are mounted on an articulator.

(5) Wire framework: By This class II, malocclusion proclination and to some extent retroclination of the incisors if labial can be fixed.

(6) Wax Pattern: If heat cure acrylic resin is used to make baseplate wax pattern in necessary but in case of self cure acrylic resin it is not necessary.

Functional appliance

A removable or fixed appliance that alters the posture of the mandible and transmits the forces created by the resulting stretch of the muscles and soft tissues and by the change of the neuromuscular environment to the dental and skeletal tissues to produce movement of teeth and modification of growth.

Functional appliances are used for growth modification procedures that are aimed at intercepting and treating jaw discrepancies.

They can bring about the following changes:

1. An increase or decrease in jaw size.
2. A change in spatial relationship of the jaws.
3. Change in direction of growth of the jaws.
4. Acceleration of desirable growth.

Advantages of functional appliances

1. It is possible eliminate abnormal perioral muscle functions which interfere with normal bone growth.
2. Treatment can be started as early as in mixed dentition stage.

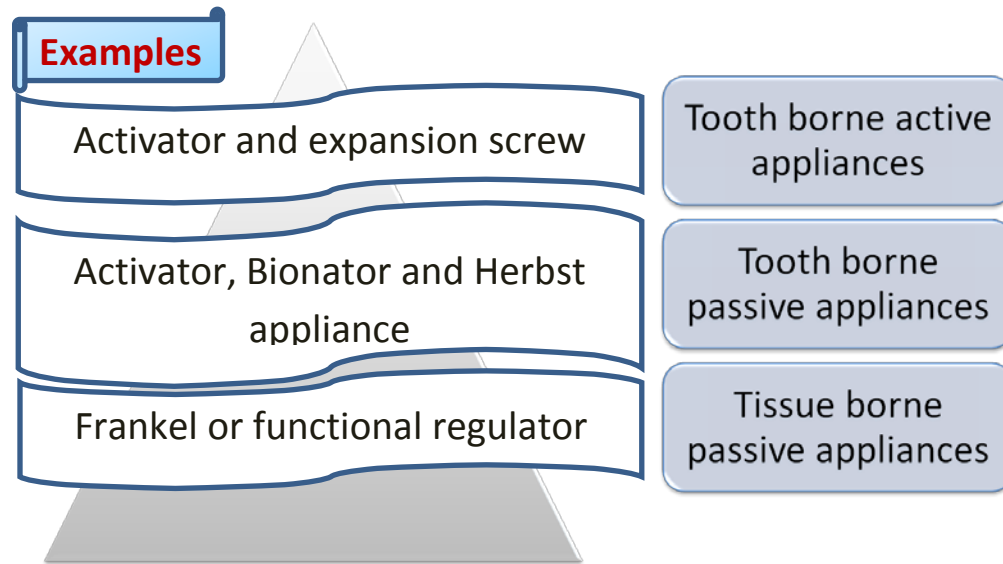
3. These appliances; do not have any side effects of mechanotherapy; such as enamel decalcification; chronic inflammation of gingiva; root resorption; e.t.c.
4. It requires less chair side time with less frequent adjustments.
5. It is easier to maintain oral hygiene.
6. It is acceptable to many patients; because it is generally worn at night time.
7. Frequency of the patient's visits is less.
8. Economic way delivering care to a large number of patients.

Limitations of Functional appliances:

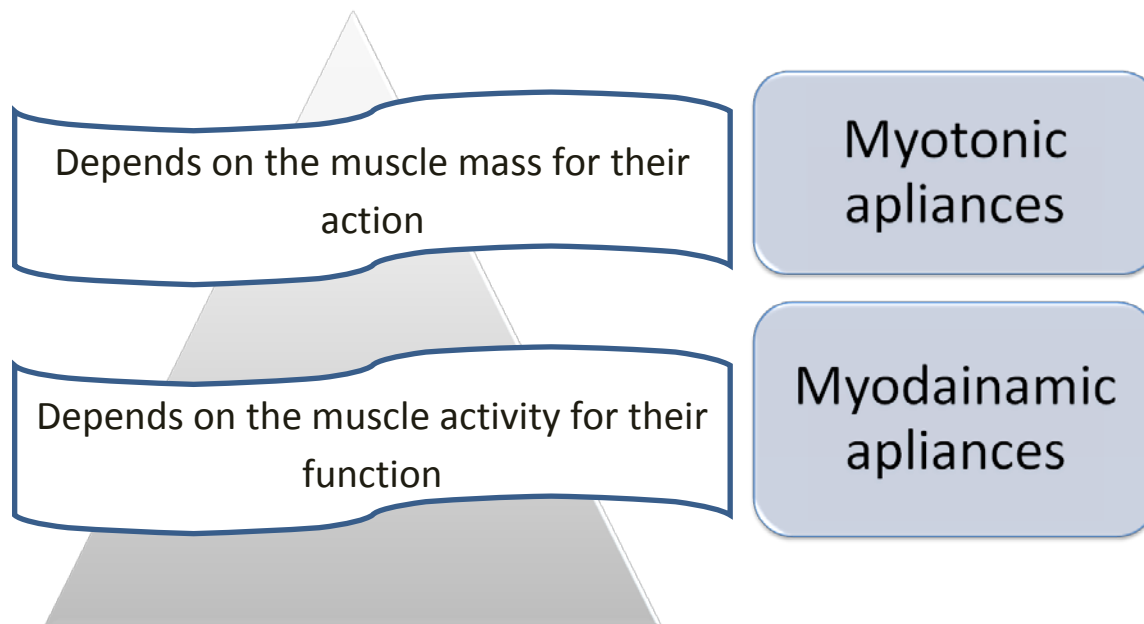
1. They can be used to correct basal bone/arch relationship and cannot be used for correcting dental malocclusion.
2. It is not useful in managing adult patients where the active growth is completed.
3. It requires a final phase of fixed appliance therapy to achieve final detailing or final alignment of tooth position.
4. The result of treatment is totally dependent upon the patient's cooperation.
5. They have a tendency to increase the lower facial height and hence, they cannot be used in patients with backward rotating mandible

Classification of Myofunctional appliances

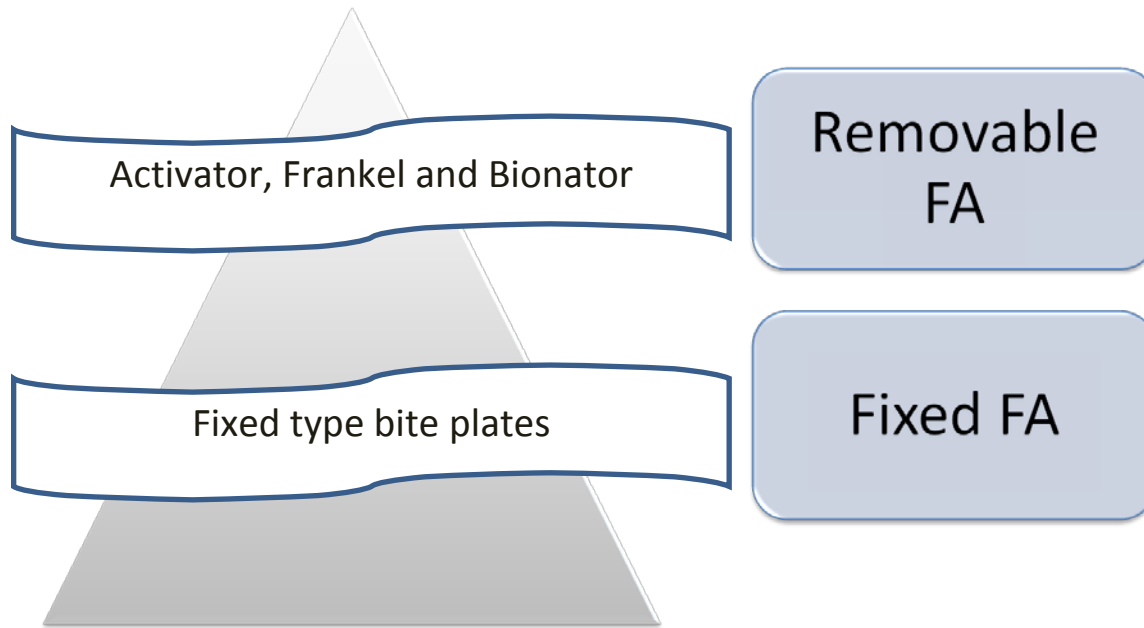
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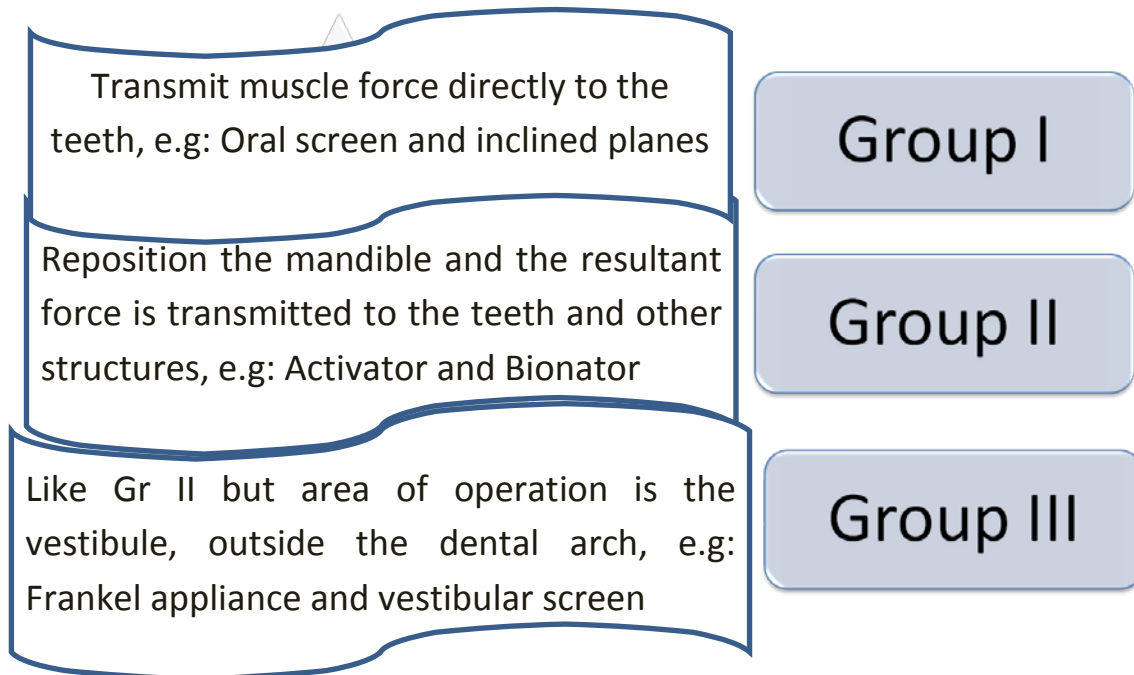
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• Fränkel appliance (Function Regulator)

Group of functional appliances developed by R. Fränkel to treat malocclusions, while aiding in the maturation, training and reprogramming of the orofacial neuromuscular system. Four main types of appliances have been described by Fränkel: Function Regulator (FR)-I was designed for treatment of Class I and Class II Division 1 malocclusions. The FR-II appliance is meant for patients with Class II Division 1 and 2 malocclusions, the FR-III was designed for patients with Class III malocclusions and the FR-IV for patients with hyperdivergent facial patterns and anterior open bite. The appliances consist of acrylic buccal (vestibular) shields and lip pads, connected by wires, to restrain and retrain aberrant musculature and to prevent the effects of restricting muscle forces on the dentition. The extension of the buccal shields into the full depth of the vestibule is supposed to stimulate the periosteum in order to achieve a skeletal expansion of the apical bases. Lingual shields also are included to accomplish a gradual, stepwise advancement of the mandible.

- **Activator (Monobloc)**

The first removable functional appliance, developed by V. Andresen. Historically, the term "activator" was introduced to describe the "activation of mandibular growth," to which the achieved correction of a Class II malocclusion was attributed. The term currently is used in a generic sense, referring to a family of functional appliances used to treat Class II malocclusions characterized, at least in part, by mandibular deficiency. [For activators designed for patients with Class III malocclusions, Class III functional.] These appliances position the mandible forward, promoting a new mandibular postural position. The reactive forces from the stretch of the muscles and soft tissues are transmitted to the maxillary dentition and through that, to the maxilla.

The acrylic body of the Andresen activator covers part of the palate and the lingual aspect of the mandibular alveolar ridge. (Note: In its original design the appliance contacted the mandibular anterior teeth only on the lingual side and did not extend over the incisal edges.) A labial bow fits anterior to the maxillary incisors and carries U-loops for adjustment. On the palatal aspects of the maxillary incisors, the acrylic is relieved to allow their retraction.

A main feature of the appliance is the faceting of the acrylic on palatal and lingual aspects of the maxillary and mandibular posterior teeth, respectively, designed to direct their eruption. On the palatal aspect of the maxillary posterior teeth the facets are cut so as to allow occlusal, distal and buccal movement of these teeth. This movement is achieved by keeping the acrylic in contact with only the mesiopalatal surfaces of the premolars and molars. On the lingual aspect of the mandibular posterior teeth the facets only permit occlusal and mesial movement, with the acrylic contacting the distolingual surface of these teeth.

• Oral screen

A removable appliance placed in the anterior vestibular region to improve lip position and reduce the overjet. In patients with a persistent tongue thrust or tongue interposition habit, it can be used in conjunction with a tongue crib.

• Vestibular shield (Vestibular screen)

A simple removable appliance made of 2 to 3 mm-thick acrylic or thermoplastic material, occupying the vestibule and extending posteriorly to the distal margin of the last erupted molar. The appliance can be constructed with the mandible placed in an anterior position so that the incisors are in an edge-to-edge relationship. The appliance is intended to eliminate an abnormal sucking habit or lip dysfunction, to establish a competent lip seal and to interrupt contact between the tip of the tongue and the lower lip, promoting maturation of the swallowing pattern. In patients with a persistent tongue thrust, the vestibular shield can be combined with a tongue crib.

Bite plate

A removable orthodontic appliance designed to (temporarily) disengage the teeth and/or prevent selected teeth from occluding. A posterior bite plate commonly is used to disclude the anterior teeth and thus facilitate

correction of an anterior crossbite. Anterior bite plates can be used to increase the lower anterior face height, to facilitate tooth movement and to correct a deep bite by extrusion of posterior teeth.

• **Lip bumper**

Intraoral removable orthodontic appliance consisting of a U-shaped 0.036-inch (0.90-mm) stainless steel wire, which in its anterior portion may carry a plastic or acrylic pad. The ends of the lip bumper are inserted into tubes on the mandibular first or second permanent molars. Its anterior portion is adjusted to lie in the vestibular area, 2 to 3 mm away from the alveolar process and the mandibular incisors (the vertical height varies).

Lip bumpers commonly are worn on a full-time basis and occasionally may be ligated in place (in case of reduced patient compliance). They are used to control or increase the mandibular dental arch length, to upright mesially or lingually tipped mandibular molars and to prevent the interposition of the lower lip between the maxillary and mandibular incisors.

Depending on the anterior configuration (with or without lip pads) the appliance has two effects: First, by removing the soft tissue forces from the labial aspect of the mandibular incisors it can cause labial tipping of these teeth.

Second, by transmitting the force from the lip to the mandibular first molars, the lip bumper causes distal movement (mainly tipping) of these teeth. This distal movement is accomplished more easily when the second molars are still unerupted or have been extracted as part of the treatment plan.

• Tongue Crib

An interceptive appliance used for correction of deleterious habits such as a deviating tongue position and/or digit-sucking. A crib typically consists of a fixed transpalatal [0.036-inch (0.90-mm) or heavier gauge] wire, soldered on two maxillary first permanent molar bands. The wire extends toward the anterior palate where it forms a crib-shaped "fence" meant to interfere with the habit. A crib also can be incorporated in a removable appliance. Posterior (lateral) tongue cribs can be used as part of removable appliances in patients with unilateral or bilateral posterior open bite.

• Habit-breaking appliance (Habit reminder)

Any removable or fixed appliance designed to correct undesirable habits such as digit-sucking, tongue interposition, tongue-thrusting, or infantile swallow.

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Dedicated To

My Mom, Zubaida Shaheen

My Dad, Md. Islam

&

My Only Son

Mohammad Sharjil

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