



Functional appliance

Dr. Bassam Ali Al-Turaihi

BDS MSc(Ortho.) MFDS RCSEdin MFD RCSI

Functional appliances

It is that orthodontic appliance utilize, eliminate, or guide the forces of muscle function, tooth eruption and growth to correct a malocclusion. The majority are designed to correct class II malocclusion, primarily by forwards posturing of the mandible in a growing child.

There are many different types of functional appliances, **but most work by the principle of posturing the mandible forwards in growing patients.** They are most effective at changing the anteroposterior occlusion between the upper and lower arches, usually in patients with a mild to moderate Class II skeletal discrepancy. They are **not** as effective at correcting tooth irregularities and improving arch alignment, so are often followed with a phase of fixed appliance treatment



Yes



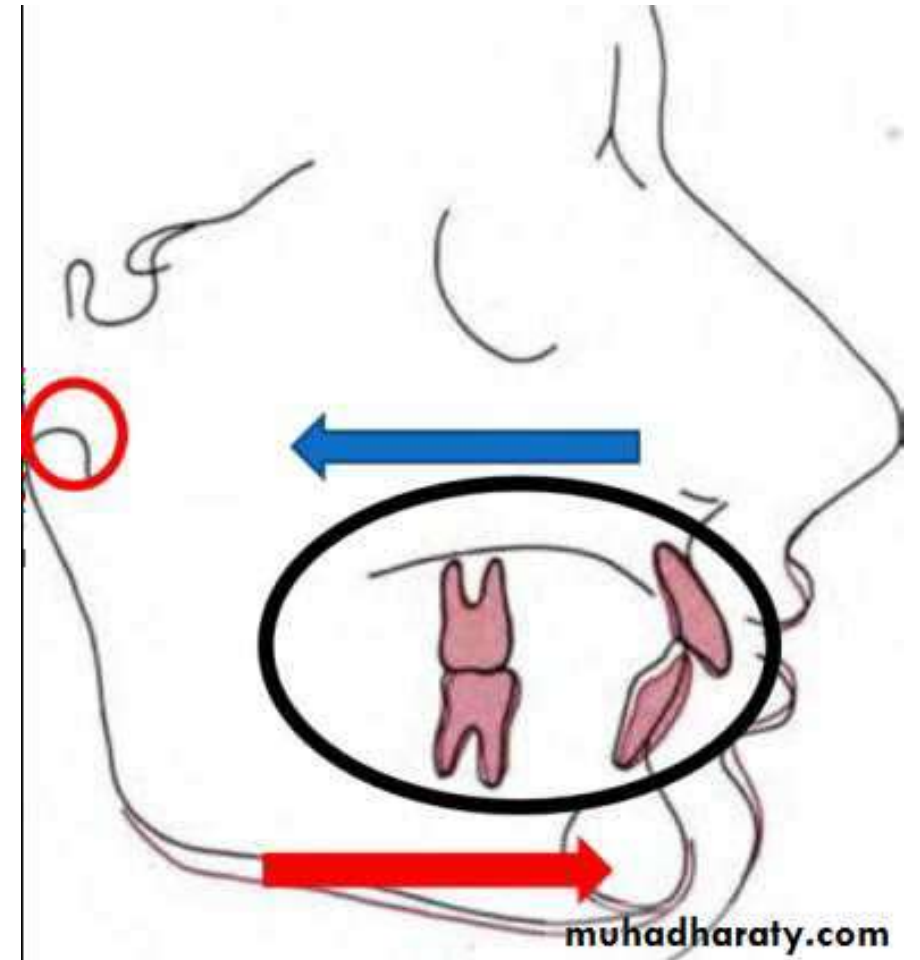
Activ



No

Theories on how functional appliances work

Functional appliances effect their changes by posturing the mandible forwards. This postural correction is fundamental to the appliances' mode of action and influences four principal regions:



1. Orofacial soft tissues: The teeth sit between the tongue on one side and the lips and cheeks on the other. If the balance of these forces is altered, tooth movement can result.

2. Muscles of mastication: Forwards posturing of the mandible results in stretch and an alteration in activity of the muscles of mastication, particularly those involved in elevation and retraction of the mandible. These forces will be transmitted to the dentition via the appliance. Because this muscle is intimately related to the condyle, it could cause change.

3. Dentition and occlusion: Forwards posturing of the mandible generates an intermaxillary force directed between the maxillary and mandibular dentitions. The class II component of this force can aid significantly with overjet reduction by simply tipping teeth.

4. Facial skeleton: Physiologists in the nineteenth century discovered that bone has the capacity to remodel when exposed to functional stimuli, which is the fundamental activity that allows orthodontists to move teeth.

Classification of functional appliance

I. According to mode of retention

1. Tooth borne:

- Passive tooth borne e.g. Andreasen, Bionator
- Active tooth borne e.g. twin block, Herbst.

1. Tissue borne e.g. Frankel

Clinical effects of functional appliances

Numerous types and designs of functional appliance have been described, each with its own treatment property. Collectively all of these appliances have similar effects, with the most significant being dentoalveolar change:

1. Retroclination of maxillary incisors;
2. Proclination of mandibular incisors;
3. Distal tipping of the maxillary dentition;
4. Restraint of forwards maxillary development;
5. Restraint of forwards mandibular development;
6. Forwards movement of the mandible due to small additional growth at the condyle and remodelling of the glenoid fossa.

Advantages of functional appliance

- Helps to eliminate abnormal perioral muscle function which interferes with muscle growth.
- No side effect of mechanotherapy (fixed appliance)
- Easy to maintain oral hygiene
- Acceptable can be worn during night

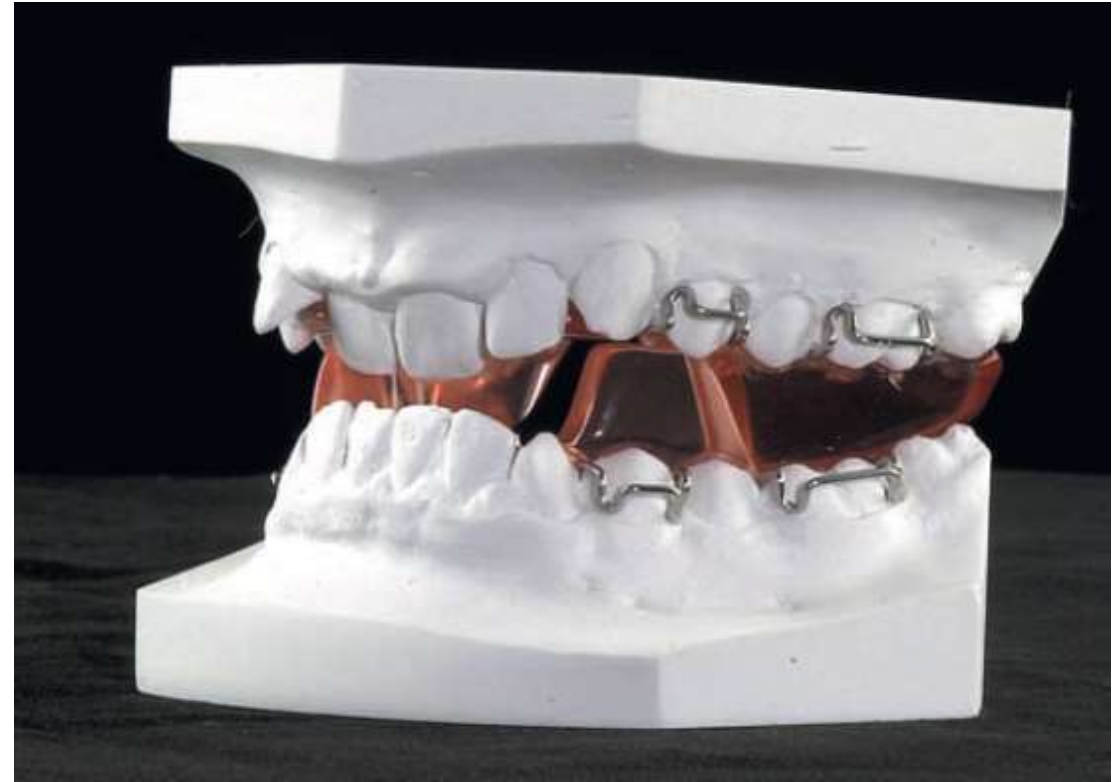
Disadvantages of functional appliance

- ⦿ Not useful in adults where active growth completed
- ⦿ Patient compliance is needed
- ⦿ Not possible to correct the rotation , crowding etc.
- ⦿ Tendency to increase lower facial height therefore contraindicated in patients with backward rotating mandible.

Types of functional appliance

Twin-block appliance

The most popular functional appliance. The reason for its popularity is that it is **well tolerated** by patients because it is constructed in two parts. The upper and lower parts fit together using posterior bite blocks with interlocking bite-planes, which posture the mandible forwards.



Herbst appliance

Fixed functional appliance and is the most popular functional appliance in the US. There is a section attached to the upper buccal segment teeth and a section attached to the lower buccal segment teeth. These sections are joined by a rigid arm that postures the mandible forwards. Because it is a fixed appliance, it removes some (but not all) compliance factors.



Medium opening activator (MOA)

This is a one-piece functional appliance, with minimal acrylic to improve patient comfort. The lower acrylic extends lingual to the lower labial segment only, and the upper and lower parts are joined by two rigid acrylic posts, leaving a breathing hole anteriorly. As there is no molar capping on the lower posterior teeth, these teeth are free to erupt. The MOA is therefore useful when trying to reduce a deep overbite.



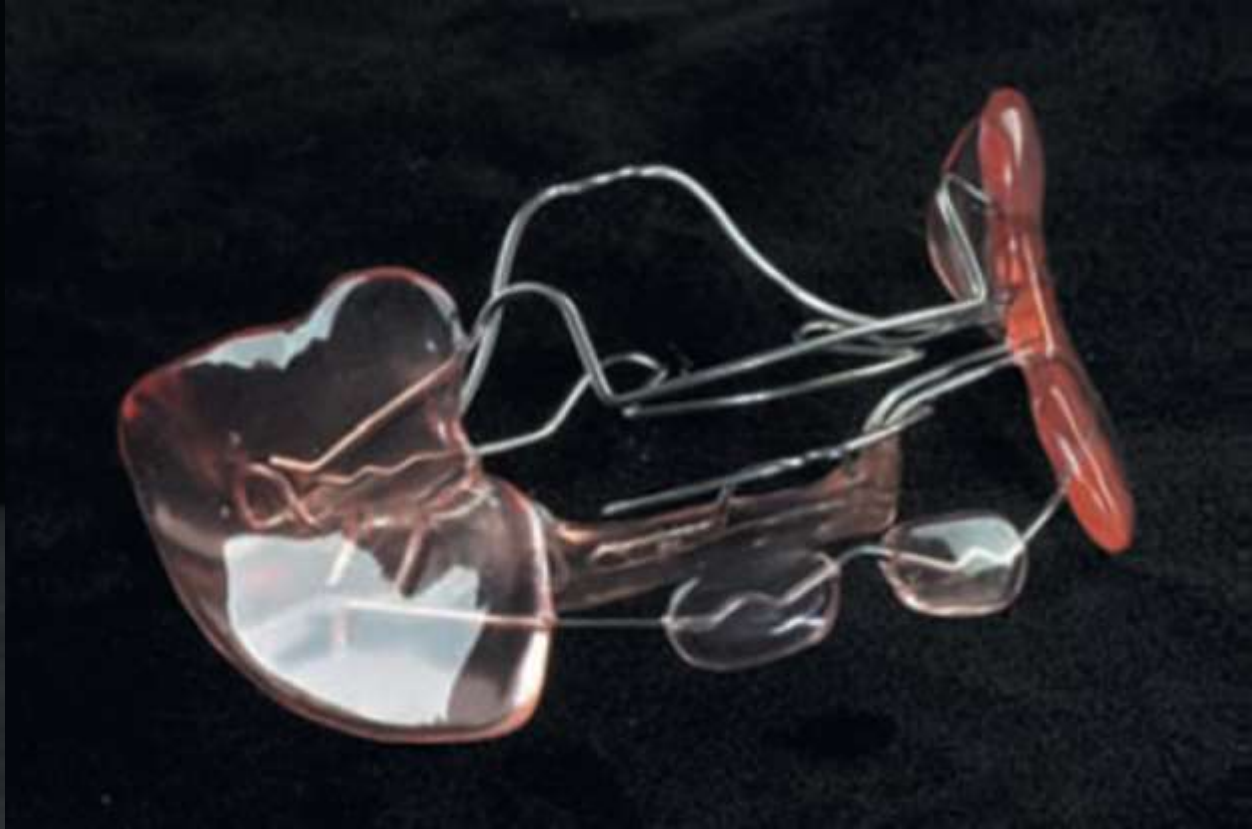
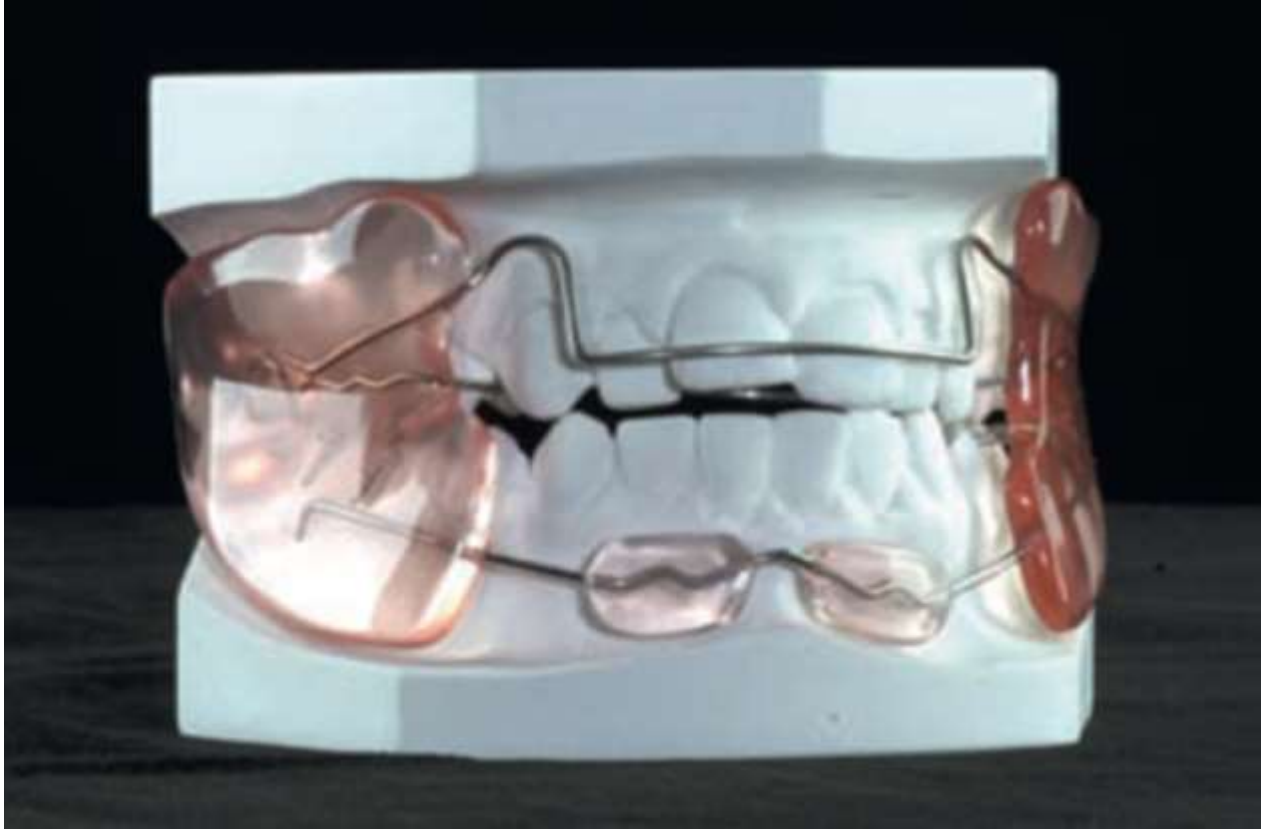
Bionator

The bionator was originally designed to modify tongue behaviour, using a heavy wire loop in the palate.



Frankel appliance

Is the only completely tissue-borne appliance. There are different versions designed to treat different types of malocclusions. Like other functional appliances it postures the mandible forwards. It also has buccal shields to hold the cheeks away from the teeth and stretch the periosteum, allegedly to cause bone formation, although this has never been proved. It can be difficult to wear, is expensive to make and is troublesome to repair. As a result it is now used less frequently.



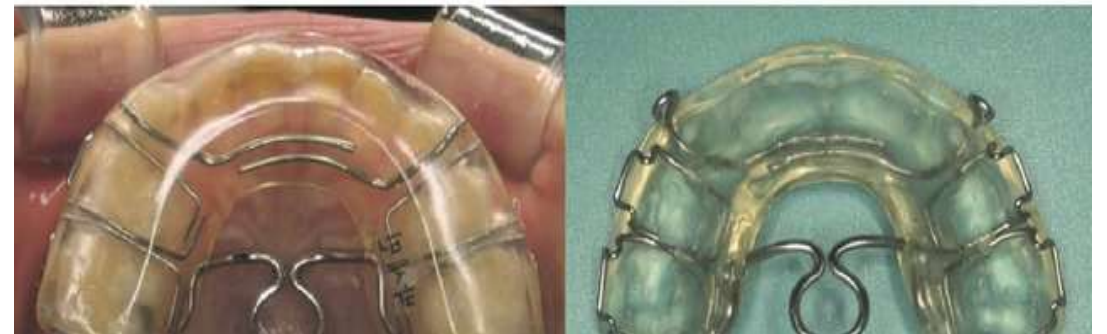
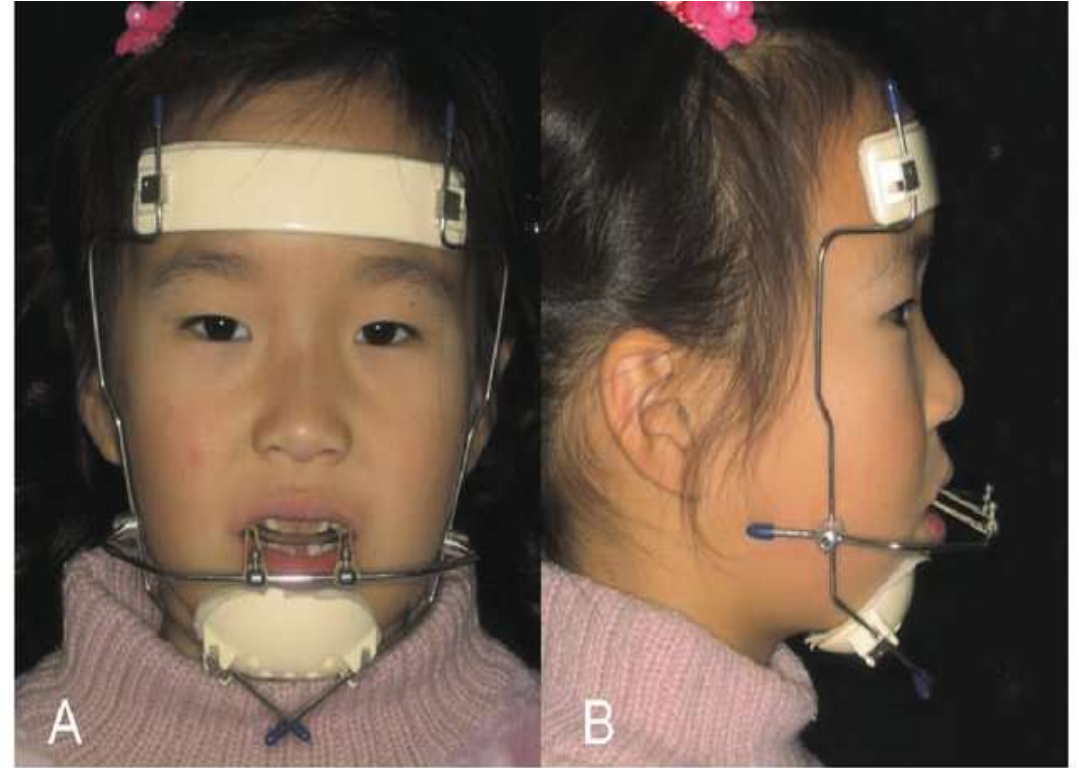
Headgear

Headgear is used to modify growth of the maxilla, to distalize (retract) or protract maxillary teeth(in growing patient) , or to reinforce anchorage.(in adult)



Facemask

(also referred as reverse-pull headgear) is a type of an orthodontic headgear used to treat underbite and other malocclusions where the upper jaw is too far backwards. A metal bar sits in front of the patients face with support from the forehead and chin. Elastics are connected to the metal bar and the teeth - directly through the lips / mouth of the patient. The elastics apply forward and downward pressure on the upper jaw.



Chin cup



Chin cups are of two types :

1) Occipital pull chin cup

- Derives anchorage from the occipital region.
- Used in class III malocclusions associated with mild to moderate mandibular prognathism.
- Also indicated in patients with slightly protrusive lower incisors as they invariably produce lingual tipping of the lower incisors.



2) Vertical pull chin cup

- Derives anchorage from the parietal region of the head.
- Indicated in patients with steep mandibular plane angle and excessive anterior facial height.
- These patients usually exhibit an anterior open bite.



Keys to success with functional appliances

1. Cooperation of the patient .
2. Favourable growth : the treatment in functional appliance should be happen in pubertal growth spurt (males 14 ± 2 years; females 10 ± 2 years) to get the maximum response.

Construction and clinical management for functional appliances

1- Impressions: Good quality alginate impressions for upper and lower dental arches/ soft tissue where the functional appliance will extend, are sufficient for fabrication of any functional appliance.



2- Bite registration; The bite registration is taken with the mandible in the most protruded or retruded position achievable without causing discomfort to construct a functional appliance for correction Class II or Class III, respectively.



3- Fitting the appliance

4- Follow -up appointments: It should be every 6-8 weeks

Duration & time to wear the functional appliance

- ◉ Functional appliance treatment should be started before the pubertal growth spurt
This is the time when the mandible may exhibit increased growth which may be influenced
- ◉ Functional appliances should be worn for at least 10-12 hours a day
- ◉ These appliances should be worn at nighttime as this is when growth takes place

A large, irregular splash of teal watercolor paint is centered on the page. The splash has a gradient from a darker teal in the center to a lighter, almost white teal at the edges. The background is a light beige and white checkerboard pattern.

Thank You