

# Fixed Functional Appliances

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## ABSTRACT

Orthodontists have been using functional devices to repair Class II malocclusions for over a century. During this time, a variety of methods have been developed, many of which have been accompanied by claims of growth modification. Recent clinical research has raised doubts about whether they have a long-term impact on face growth, the effects on the skeleton are temporary. Regardless of the outcome, the therapeutic efficacy of these devices is recognised and sagittal arch defects can be corrected. The clinical usage of functional devices will be discussed in this article, as well as the supporting evidence and limits. The objective being to assess the methodical literature and how functional devices affect dental and facial framework when Class II malocclusions are corrected. Activator and the functional regulator are the only two devices under scrutiny. To determine the skeletal and dentoalveolar results of fixed functional devices on Class II malocclusion. The goal of this study was to assess scientific research on the impact of functional devices on dentofacial structures in the treatment of Class II malocclusions. The activator and the functional regulator are the only devices under consideration. Since the 1930's, functional devices have been employed. Despite their long history, there is still a lot of misunderstanding about how to use them. The order of several muscular groups that control the mechanism and location of the lower jaw in order to transmit pressure to the dental structures and the bone is changed via device methods. These powerful forces frequently result in dental and skeletal changes. The two basic categories of functional devices are moveable and fixed functional devices. Patients who are resistive to detachable equipment or who have reached the end of their active growth phase are given fixed functional devices.

**Key words:** Cephalometry, Orthodontics, Functional, Malocclusion, Design, Removable, Methods

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which is sometimes backed up by pseudo-scientific growth ideas. Many of the claims made in connection with these devices are false. Studies that rely on faulty and overly convoluted cephalometric analysis, with the entire congenital predisposition that entails with it [1-3]. The findings have lately proven the best evidence in studies of what these devices are capable of, and they are equally important.

## INTRODUCTION

The phrase "Fixed Functional Device" (FFR) indicates a unique group of devices used in orthodontics, the majority of which are used to treat Class II malocclusions. Which was initially created in UK, although orthodontists in various nations have accepted them? Which functions by propping the mandibular jaw forward, providing a force that is conveyed to the teeth through stretched muscles and soft tissues? Additionally, the muscle tissue covering which encircles the dentition is altered. Teeth move, a new occlusal connection is developed and results in overall reduction of over jet. For many years, orthodontists have been intrigued by the effectiveness of these gadgets in resolving sagittal disparities in growing patients, specifically the question of whether they have a substantial impact on growth of skeleton. There has been a lot of misinformation and confusion about the application,

## LITERATURE REVIEW

### History

Early in the twentieth century, functional devices were invented and used in Europe during the exact time that fixed devices were being manufactured in United States. In 1902, Pierre Robin published a basic mono block device for retrognathia of mandible and extensions of jaw in a functional manner, which preceded the Class II malocclusion device as demonstrated by Viggo [4]. Andresen being the faculty at the Oslo dentistry school. According to narrative, after fixed device therapy, he fitted his daughter with a Maxillary Hawley retainer with a mandibular lingual flange that moved the mandible forward into an ideal inter archy interaction at its best.

The device was put as a night time retainer throughout her vacation for 3 months during summer, and it successfully healed her Class II relationship. Andresen, with Karl Haup's support, refined the approach and frame the name 'Functional Jaw Orthopedics' to encompass the ideas.

### Mechanism of action of fixed functional devices

In growing patient fixed functional devices without a question reduces even an extreme over jet. The actual quest being how to attain it. It has been proven that it projects by the amalgamation of soft tissue envelope along with disarray of occlusion and generating inter maxillary force. The teeth are in a soft tissue harmony zone between the labial mucosa and buccal mucosa on one side and the tongue on the other. Some FFR systems, such as the Rolf Frankel functional enhancer, use buccal screen and labial screen or cushions to move the labial and buccal mucosa away from the teeth. The arches of the teeth, particularly the higher ones, the forces of the soft tissues are eliminated are able to expand [5]. Very sparse proof is available that this sort of expansion is more stable than other more aggressive forms of growth, particularly at the width between the lower two canines that is relapse prone. Orthodontists frequently when using inter-maxillary elastics to help rectify antero-posterior issues and offer anchoring support, pitch one jaw against the other. The muscles and soft tissues surrounding the teeth have a similar effect when using functional devices. Many activator-style devices were created to be loose in the mouth and maintained in place by the elevator and protractor muscles of the jaw. The forces created were applied to the bone and teeth. Because they are sporadic and would be reduced at night, some of the devices were framed to expand the bite at right angles to horizontal plane to a far higher extent than andresen's real activator. According to the deduction, this listed the elasticity of the musculature and CT, or 'viscometric forces,' that will continue to operate even though muscular moment has subsided. The device has to be like placed at night. Therefore, activators such as the Harvold or Woodside expand the bite far wider than the highway gap. The Twin Block device should achieve similar results. While EMG findings are unclear, if not contradictory, there is no doubt that the device's postural component distributes significant force between the maxillary and mandibular dentitions [6]. When the mandibular incisors are proclinated and the maxillary incisors are retroclinated, the dentoalvolar effects become most obvious in clinical practise. Because full-time directed forces continuously generate rapid tilting of the dentition and change in the occlusion is seen, these dental modifications are most obvious with fixed functional equipment.

**Uses:** In the preliminary dentition, but especially in the initial mixed dentition, an intensified over jet and Class II division 1 type of malocclusion can be evident with the outbreak of the secondary incisors. At this moment, the urge is to initiate therapy with a FR to minimise the horizontal overlap of the maxillary incisors over the

mandibular incisors soon. While initiating treatment in the child who has not hit puberty is normally favourable, it often necessitates a longer term of retaining to allow the secondary dentition to enact before a second sequence of events of FR is used to fine-tune the occlusion. Early treatment appears to be equal to a single course of treatment delivered during adolescence, according to research. Termination to direct the attention at the proper timing may lead in the patient losing the opportunity to even have minor bony disturbances free from errors with FR, requiring the usage of more dangerous and expensive orthognathic surgery increasing the horizontal overlap between the maxillary and mandibular central incisors [7]. Early therapy appears to create a brief, but possibly considerable, boost in self-esteem, and can have psychological ramifications, making a youngster more sensitive to bullying [8]. As a result, treatment may be started earlier in some people which are considered at a very higher risk of trauma, people which are precisely concerned about the appearance of their smile and being conscious or made fun of, realising that overall timing for the required treatment will be extended or that in some instances another shot may be necessary. A horizontal overlap of the maxillary central incisors over the mandibular of up to 10 mm in theory be addressed with a one step, but positioning beyond this is very hard to bear, therefore a device will need to be activated again or a another device will be used after the reduction of horizontal overlap between the maxillary and mandibular central incisors has been achieved. Devices such as activator in half and move the lingual flanges forward to reactivate them. Herbst or other FR devices can be reactivated by adding round piece of metal or crumbled wedge to the male part of the cylinder or solid disc; Twin Blocks can be reactivated by adding acrylic to the block; Herbst or other fixed functional devices can be reactivated by adding rings or crimpable shims to the male component of the telescope or piston. Some dentists, on the other hand, believe that reducing the over jet gradually by reactivating the device is preferable to doing it all at once.

It's crucial to make sure the patient isn't projecting his or her jaw forward on a regular basis, and the extent to which he or she does so from the occlusal position, also known as the reversed over jet, should be checked [9]. The device is being worn if normal speech returns and there is proof of common damage or depreciation associated with the device. A lateral open bite develops after a few weeks of full-time use with a Twin Block device. The device is not being worn if there is no reduction in the over jet or correction of the buccal segment connection, no improvement in speech, and repeated breakages when the device is withdrawn too frequently.

More the stable the solution appears to be, the longer the device can be kept working. In an ideal world, the mandible's posture has to be in the same exact manner until an adult human reaches maximum growth, but this is difficult to attain, especially if FR are being considered, as the duration of treatment is increased than the

original. Some doctors limit the device's use to night time just to permit for some occlusal settling. The glenoid fossa which comprises of brand new cells initially, on the other hand, will be less mature, presence of an ample network of blood vessels, and prone to resorption until it fully calcifies, which will only occur if it is not loaded. Because this bone takes time to grow, any skeletal remodelling or modification that occurs as a result of the device being removed too soon or worn only part-time may be lost. Because many cases of crowding also require FFA device treatment, a period of FF device therapy is typically required after FF device therapy. Consolidating and explaining the occlusion that has been remedied.

### DISCUSSION

Bone remodels and adapts to mechanical loading, which has been recognised since the nineteenth century. Foot binding and the wearing of neck rings are examples of cultural behaviour that support this notion, demonstrating that variables of the environment can transform and shape of the skeleton. Forces of such magnitude, on the other hand, during the maximum growth period are already present. As a result, while functional devices do cause the growth of the jaw bones, this is highly possible than being a rather result for a short period of time while the device is worn. Despite the lack of proof that jaw growth can be significantly affected by fixed functional devices, this has proven to be an appealing and compelling proposal for both clinicians and patients. So, how do functional devices generate quite evident and usually long-term correction for Class II malocclusion if they don't increase mandibular protrusion? The dentition of the maxilla is tipped at the farthest while the mandibular teeth are tipped closest as a result of the dentoalveolar effect. They also 'leap the bite,' separating the jaw from the maxilla and limiting maxillary growth. While the patient is still growing, a new occlusal connection is established. Under normal circumstances the growth of the mandible precedes the maxilla. This unique growth does not usually result in correction in untreated Class II cases because the Class II occlusal cuspal link is intact and the jaws move forward together. The mandible's intrinsic bigger growth than the mid face allows the condyles to grow back into the space if a new Class I occlusal connection is formed and maintained while the patient is growing.

### Limitations

Compliance is the fundamental issue with removable functional items. Because these devices can influence speech and oral function, they are often difficult to wear, and not all patients tolerate them. Twin blocks have been found to have failure rates of up to 34% in prospective trials [9]. The main reason for this is failure to comply. FFA hypothetically sort the issue of patient complying of whatever is told, and are more likely to damage also are extremely pricey, hence they are less popular in the UK than in other parts of the world. Because any greater bone development requires time to establish, Tipping causes more tooth movement, and the shorter treatment

time makes recurrence more likely. Finally, it's important to remember that functional devices have a significant dento alveolar influence, with lower incisor proclination and upper incisor retroclination almost universally occurring. Relapse of the lower incisors is inherently unstable. As a result, patients with proclined lower incisors should avoid using functional devices. They can be used prior or after the functional phase of treatment in Class II division 2 malocclusions if the upper labial segment is proclined or decompensated.

### CONCLUSION

Regardless of the lacking proof that FFA have a practically meaningful long-term impact on growth of the mandible, they are particularly impactful in resolving Class II malocclusions and minimising increasing horizontal overlap between maxillary and mandibular central incisors. It is attained through a combination of dentoalveolar actions, changes in the muscle niche, and the exploitation of the lower jaw's larger development capacity than the upper jaw during the patient's maturation period. However, many of these devices are difficult to accept and wear, making compliance difficult. As a result, successful treatment is not a guaranteed. As a result, any capable patient must be thoughtfully chosen, at the appropriate age and skeletal morphology, and advised of the significance of excellent cooperation prior to beginning what can be a challenging but ultimately rewarding treatment.

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