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Functional Appliance: Fixed vs removable

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The College of Dentistry, Al-mustaqbal University,
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of Dental Surgery

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

إِنَّا فَتَحْنَا لَكَ فَتْحًا مُّبِينًا

صدق الله العلي العظيم

آية رقم 1

سورة الفتح

Certification of the Supervisor

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Supervisor's name: **Dr. ahmed almusawey**

Date:

Dedication

I dedicate my humble effort to those who gave me life and hope and who taught me to rise up the ladder of knowledge with patience and wisdom and who helped me, my dear parents, and to those who overwhelmed me with their love, my sisters, and to my friend who was my companion on the path and in the situations, and to everyone who supported me in paving this path, the path of knowledge towards a full scientific journey, by giving, asking God Almighty for payment, guidance and success.

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Introduction

The term functional appliance refers to a group of orthodontic appliances designed to modify the activity of the orofacial muscle groups that influence mandibular position and function, thereby transmitting forces to the dentition and basal bone. Alterations in the sagittal and vertical position of the mandible lead to changes in muscular forces, which subsequently produce both orthopedic and orthodontic effects **(Proffit et al., 2018)**.

The term *functional appliance* originated from the early belief that these appliances corrected abnormal functional patterns around the dentition, thereby inducing changes in craniofacial growth. However, contemporary evidence suggests that functional changes play a limited role in the overall treatment effect, with skeletal and dentoalveolar adaptations being primarily related to mandibular repositioning rather than true modification of muscular function **(Pancherz, 2016; Ruf & Pancherz, 2018)**.

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 antero posterior 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 treatment often involves a phase of fixed appliances **(Tulloch, 2014)**.

Myofunctional appliances utilize forces of the orofacial musculature to modify or change the direction of growth in a still-growing patients **(Kumar et al., 2021)**.

Review Of Literature

1.1. Definition of Functional appliances

Functional appliances utilize, redirect, or control the forces generated by the muscles of mastication, tooth eruption, and craniofacial growth in order to correct malocclusion and promote favorable orthopedic and dentoalveolar changes (**Proffit et al., 2018; Pancherz, 2016**).

1.2 Indications

- Immediate alteration of the profile, smile and facial expressions that helps to improve psychologic problems.
- Improvement of skeletal disharmony.
- Periodontal problems caused by deep overbite can be prevented.
- Traumatic injuries on upper incisors have less opportunity to occur.
- Sucking habits immediately disappear.
- Labial competence is established and mastication is improved.
- Oropharyngeal space is increased, as well as space for the tongue.
- Functional problems like mouth breathing and speech difficulties
- To correct cII Malocclusion and cIII Malocclusion(**Proffit et al., 2018**).

1.3 Contraindications

- CL II skeletal by maxillary prognathism
- Vertically directed grower
- Labial tipping of lower incisors Crowding (**Laura Mitchels,2007**).

1.4 Keys to normal occlusion

Described an ideal occlusion rather than a normal occlusion; the ideal occlusion described by Angle and Andrews serves as a paragon of occlusal excellence that gives clinicians a treatment goal to which they can aspire (**Pancherz, 2016**):

1. Molar relationship: The mesiobuccal cusp of the upper first molar occludes with the groove between the mesiobuccal and middle buccal cusp of the lower first molars and the distobuccal cusp of the upper first molar contacts the mesiobuccal cusp of the lower second molar.
2. Crown angulations: (Mesiodistal tip) All teeth crowns are angulated mesially.
3. Crown Inclination: Inclination refers to the labiolingual or buccolingual inclination of the crown of the teeth.
4. Rotation: Rotations are not present.
5. Spaces: Spaces are not present.
6. Occlusal plane: is either flat or slightly curved.

1.5 CL II Malocclusion

1.5.1 Classification of Class II Malocclusions

A. Skeletal Class II Malocclusions:

This term indicates that the Class II malocclusion is resulting from an anteroposterior disproportion in size or discrepancy in position of the jaws rather than malposition of the teeth relative to the jaws (retrusion of mandibular teeth or protrusion of maxillary teeth or both) which is commonly associated with Class II dental malocclusions. Typically, some natural dental compensation is observed in the presence of the skeletal discrepancy. This compensation tends to make the dental discrepancy less

severe than the skeletal discrepancy and is exhibited most often as protrusive mandibular incisors and less frequently as retrusive maxillary incisors. Another typical compensation is a maxillary dental arch that is narrower or constricted than normal because it is in occlusion with a narrower part of the mandibular dental arch. This transverse dental compensation is characterized further by mesiolingual rotation of the maxillary first molars. Skeletal Class II malocclusions can be subdivided conveniently into those comprised of either mandibular deficiency or maxillary excess or combination of both skeletal discrepancies (**Baccetti et al., 2015**).

B. Dental Class II Malocclusions: Depending on Angle's classification system for malocclusions which describes anteroposterior relationships of the permanent first molars and categorized the Class II malocclusions as having a distal relationship of the mandibular teeth relative to the maxillary teeth of more than one-half the width of the cusp. Angle divided the Class II malocclusions based on the inclination of the maxillary central incisors into :

1-Class II Division 1 malocclusions: are described as having labially inclined maxillary incisors, an increased overjet with or without a relatively narrow maxillary arch and overbite range from a deep to an open bite(**Proffit et al., 2018**). (**Figure 1**).

2-The Class II Division 2 malocclusions: are described as having excessive lingual inclination of the maxillary central incisors overlapped on the labial by the maxillary lateral incisors (**Figure 2**). In some cases, both the central and the lateral incisors are lingually inclined and the canines overlap the lateral incisors labially. The Class II Division 2

malocclusion is often accompanied by a deep overbite and minimal overjet. In cases with extreme overbite, the incisal edges of the lower incisors may contact the soft tissues of the palate. In a few Class II Division 2 cases, the mandibular labial gingival tissues may be also traumatized by the lingually inclined maxillary incisors, particularly in the absence of an overjet. With Class II Division 1 or 2 malocclusions, the molar relationship may be unilateral or bilateral. Unilateral cases are classified as a “subdivision” of the affected side (Pancherz, 2016).



Figure 1:Class II Division 1 Malocclusion with proclined maxillary central incisors. (Proffit et al., 2018).



Figure 2: Class II Division 2 Malocclusion with retroclined maxillary central incisor teeth. (Pancherz, 2016).

1.6 Appliances used for treatment of CL.II

The options for correction of class II malocclusion in growing patients consist of two principal categories: intraoral appliances and extra oral appliances .

1.6.1 Intra-oral Appliances

1.6.1.1 Removable intra-oral appliances

A-Activator

Elements: Labial bow and retention thorns 0.8 mm spring hard

Function: Mandibular advancement and opening of the vertical dimension

Description: By this passive and loose appliance functional stimuli are transmitted to the bone tissue via muscle activity for example during swallowing. **(Figure 3).**

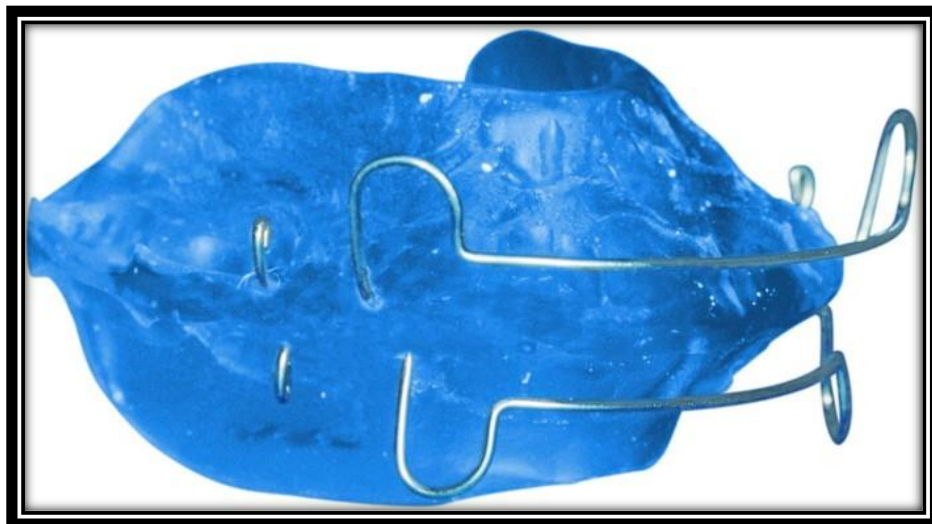


Figure. 3: Activator Appliance (Ruf & Pancherz, 2018)

The classical activator according to Andresen and Häupl is still one of the main appliances for changing the position of the mandible and for the opening of the vertical dimension. It can also be used for the lateral side shifting of the lower jaw. This appliance, originally called Monobloc, does not have any elements that can be activated and is designed as delicate as possible. The retention thorns only anchor the molars maximally, not the appliance, whose ideal function is as an exercise device(**Ruf & Pancherz, 2018**).

Indications

- a. Class I malocclusion with deep bite.
- b. Class I malocclusion with open bite.
- c. Class II division 1 malocclusion.
- d. Class II division 2 malocclusion after aligning the incisors.
- e. Class III malocclusion (reverse activator).
- f. Serves as space regainer in mixed dentition where acrylic is extended into the space of missing tooth.
- g. Used for treating patients who snore during sleep (**Cozza et al., 2015**).

Contraindications (Cozza et al., 2015).

- a. Crowded arch.
- b. Increase lower facial height.
- c. Extreme vertical mandibular growth.
- d. Severe proclined lower incisors.
- e. Retroclined upper incisors.
- f. Crossbite tendency.
- g. Gross intra-arch irregularities.

Advantage (Cozza et al., 2015).

- Appointments can be delayed over 2months .
- Tissues not injured .
- Worn at night time only .
- Helps to eliminate abnormal habits .
- Oral hygiene is maintained.

Disadvantages (Cozza et al., 2015).

- Fully rely on patient cooperation .
- Little value in cases with crowding .
- Force on individual tooth can not be controlled .
- Little or no response in older patients .
- Bulky and uncomfortable

Timing of treatment

The patient is instructed to wear the activator for approximately **10–12 hours per day during the initial phase of treatment**, with the duration gradually adjusted once the patient becomes accustomed to the appliance. Adequate daily wear time is considered essential to ensure effective orthopedic and dentoalveolar responses and to optimize treatment outcomes with functional appliances (**Proffit et al., 2018; Cozza et al., 2015**).

B- Bionator

The Bionator was originally developed to influence tongue posture through the incorporation of a palatal wire loop. However, contemporary evidence suggests that tongue position alone is unlikely to be the primary etiological factor for increased overjet. One of the main advantages of the Bionator is the absence of extensive palatal acrylic, which improves patient comfort and compliance. Additionally, the buccal extension of the labial bow helps to keep the cheeks away from the buccal segment teeth, facilitating transverse arch development and allowing limited arch expansion (McNamara & Brudon, 2016; Singh & Clark, 2017).

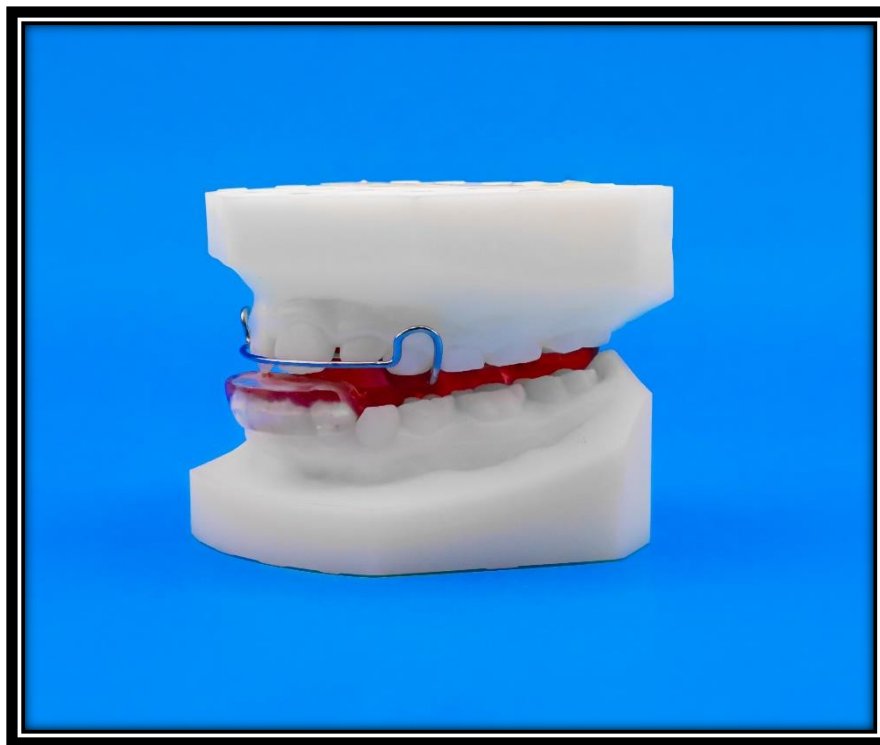


Figure 4: Bionator Appliance (Singh & Clark, 2017)

Indication

The Bionator appliance is indicated for the management of various malocclusions and bite problems, including:

1. Class II malocclusion
2. Class III malocclusion
3. Deep bite cases
4. Open bite cases

Timing of treatment

Treatment duration has been observed to vary, typically ranging from 10 months to 2 years, with an average of approximately 13 months. Patients are generally instructed to wear the appliance full-time, except during meals and play, to achieve optimal skeletal and dental correction (Stasi et al., 2019; Sharma et al., 2017).

C-Twin Block Appliance

The twin block appliance was first introduced by Clark in 1977 as a two-piece functional appliance, consisting of separate maxillary and mandibular components with occlusal acrylic portions serving as inclined guide planes and bite blocks. These features posture the mandible downward and forward, promoting correction of Class II skeletal patterns. Compared to other removable functional appliances, the twin block allows a greater range of mandibular movement and can be adjusted and modified more easily. However, it carries a slightly higher tendency to protract mandibular incisors. Active components can also be incorporated into the appliance, similar to other removable tooth-borne functional appliances, to enhance specific dental or skeletal effects (Clark, 2016; Cozza et al., 2015). **Figure 5**

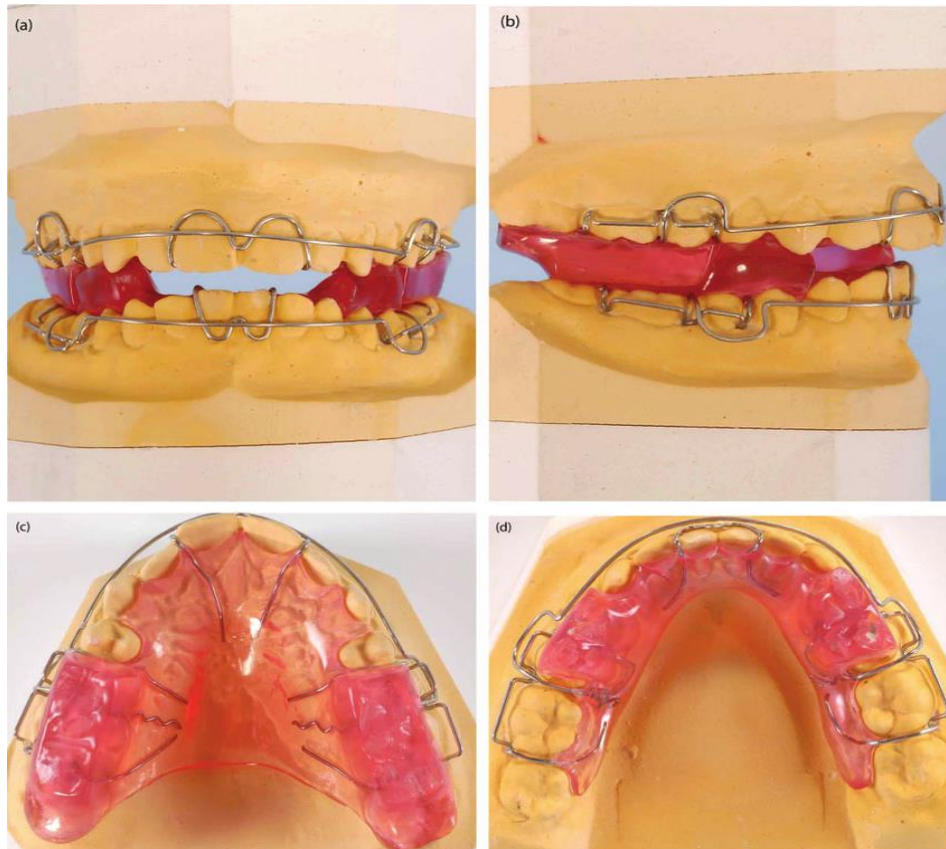


Figure.5 Twin-block appliance (a) anterior, (b) lateral, (c) upper occlusal and (d) lower occlusal views. (Clark, 2016; Cozza et al., 2015).

Indications (Jena et al., 2017; Pancherz, 2016).

The functional appliance is indicated for the treatment of a variety of skeletal and dental conditions, particularly in growing patients. These include:

- **Mandibular retrognathia**
- **Mesofacial or brachyfacial patterns**
- **Dental Class II, Division 1 malocclusion**
- **Deep bite and open bite cases**
- **Growing patients requiring orthopedic correction**

Contraindications

Functional appliances, such as the Twin Block, are generally contraindicated in cases where residual posterior lateral open bites remain at the end of the functional phase. This is especially observed in patients who initially present with a deep overbite, as the occlusal coverage of the bite blocks may prevent normal eruption of the posterior teeth, potentially exacerbating the open bite **(Pancherz, 2016; Jena et al., 2017)**.

Timing of treatment

For effective outcomes, the Twin Block appliance is typically worn full-time, including during meals. The average treatment duration ranges from 9 to 12 months, depending on the severity of the malocclusion and patient compliance. Regular adjustments and follow-up are essential to ensure proper mandibular advancement and dental alignment **(Clark, 2016; Cozza et al., 2015)**.

D-Frankel Appliance

Another type of functional appliance is the removable tissue-borne appliance, commonly known as the Frankel appliance or functional regulator, originally developed by Rolf Frankel. This appliance was designed to minimize unwanted tooth movement, recontour the facial soft tissues adjacent to the teeth, and posture the mandible downward and forward.

The appliance incorporates a mandibular lingual acrylic flange that positions the mandible forward, while mandibular labial acrylic lip pads and large acrylic buccal shields help to hold lip and cheek pressures away from the teeth and provide soft tissue support. All acrylic components are interconnected with a wire framework, including a labial bow and transpalatal wire. Compared to traditional functional appliances without active expansion screws, the Frankel appliance has a greater influence on arch expansion and promotes favorable dentoalveolar changes during the growth phase (Ruf & Pancherz, 2018; Jena et al., 2017). **Figure 6**



Figure 6 Frankle Appliance. (Ruf & Pancherz, 2018; Jena et al., 2017).

Indications

The Frankel appliance is indicated for the management of a variety of malocclusions and dentofacial conditions, particularly in growing patients. These indications include:

- Treatment of **Angle's Class I malocclusion with deep bite**
- Management of **Class II Division 1 malocclusion** with overjet **not exceeding 5 mm**
- Management of **Class II Division 1 malocclusion** with overjet **greater than 7 mm**
- Treatment of **Class II Division 1 and Class II Division 2 malocclusions**
- Management of **Class III malocclusion**
- Correction of **bimaxillary protrusion and open bite**
- Can be used in combination with **headgear** for enhanced orthopedic effect

These indications reflect the appliance's capacity to modify mandibular posture, expand the dental arches, and influence soft tissue structures, making it suitable for complex dentofacial corrections (**Ruf & Pancherz, 2018; Jena et al., 2017**).

Timing of treatment

The appliance is generally applied during the middle to late mixed dentition phase. The typical treatment duration ranges from 18 to 24 months, with full-time appliance wear recommended to achieve effective skeletal and dental correction (**Ruf & Pancherz, 2018; Cozza et al., 2015**).

1.6.1.2 Fixed Functional Appliances

A major limitation of removable functional appliances is patient compliance, as their effectiveness depends on wearing the device for the prescribed number of hours daily. This challenge can be addressed with fixed functional appliances, which deliver continuous orthopedic and dentoalveolar effects without relying on patient cooperation. Among these, the Herbst appliance is one of the most widely used and studied devices (De Clerck et al., 2016; Pancherz, 2017).

A-Herbst Appliance

The Herbst appliance is a fixed intermaxillary appliance that has proven to be effective in promoting mandibular advancement and correcting Class II malocclusions. Originally developed by Emil Herbst in the early 1900s, it consists of a bilateral telescopic mechanism attached to orthodontic bands on the maxillary first permanent molars and mandibular first premolars. This mechanism maintains the mandible in a continuous forward-postured position, also referred to as an anteriorly “jumped” position.

Alternatively, bands may be placed on the first maxillary premolars and first mandibular permanent molars, while a lingual bar connects the maxillary or mandibular premolars with the molars. This design ensures stable mandibular advancement and allows for controlled dental and skeletal changes throughout the treatment (Baccetti et al., 2015; Ruf & Pancherz, 2018). **Figure 7**



Figure 7: Herbst appliance. (Baccetti et al., 2015; Ruf & Pancherz, 2018).

Indications

The Herbst appliance is indicated for the management of a range of **Class II skeletal and dental discrepancies**, particularly in growing patients where compliance with removable appliances may be limited. Specific indications include:

- Noncompliance treatment of Class II skeletal discrepancies, especially in young patients
- High-angle patients, due to potential stimulation of sagittal condylar growth
- Patients with deep anterior overbite
- Cases with mandibular midline deviation
- Mouth breathers or patients with anterior disk displacement
- Treatment of Class II malocclusion with retrognathic mandibles and retroclined maxillary incisors
- Obstructive sleep apnea in patients requiring mandibular advancement, **(Baccetti et al., 2015; Ruf & Pancherz, 2018; De Clerck et al., 2016).**

Contraindications

The Herbst appliance is contraindicated in cases where there is unfavorable craniofacial growth, unstable occlusion, or persistent oral habits that may contribute to occlusal relapse. It is also not recommended for autistic children or patients with severe bruxism, as appliance management and tolerance may be problematic (De Clerck et al., 2016; Ruf & Pancherz, 2018).

Advantages

The Herbst appliance offers several clinical advantages over removable functional appliances:

- **Continuous 24-hour action**, eliminating reliance on patient compliance
- **Shorter treatment duration** (typically 6–8 months), compared to removable appliances that may require 2–4 years
- **Standardized treatment protocol**, with improved patient acceptance and tolerance
- **Immediate improvement in facial profile** upon placement
- **Maintenance of good oral hygiene**, due to its fixed design (Baccetti et al., 2015; Pancherz, 2017)

Disadvantages

Potential drawbacks of the Herbst appliance include:

- **Anchorage loss**, resulting in diastemas between the upper canines and first premolars, or **proclination of lower incisors**
- **Chewing difficulties** during the initial week of treatment
- **Soft tissue impingement**, breakage or distortion of the appliance
- **Mechanical issues**, such as bent rods, loose or broken bands, and occasionally **loose or broken screws** (Ruf & Pancherz, 2018; Pancherz, 2017)

Timing of Treatment

The **Herbst appliance** is a fixed device, which allows it to function 24 hours a day, providing continuous mandibular advancement. Its relatively short treatment duration (typically 6–8 months) makes it especially suitable for postpubertal patients and young adults, compared to removable functional appliances that usually require 2–4 years of wear (**Baccetti et al., 2015; De Clerck et al., 2016**).

B – Jasper Jumper Appliance

The Jasper Jumper appliance consists of two main components: the force module and the anchor parts. The force module is flexible and comprises a stainless steel coil spring encased in an opaque gray polyurethane material, which covers part of the anchoring ends. This design improves durability, as the original design lacked this overlap, resulting in frequent breakage of the modules.

The modules are side-specific (right or left) and are available in seven lengths ranging from 26 to 38 mm in 2 mm increments, with size markings on the maxillary end of the module. The appliance delivers continuous orthopedic forces to advance the mandible while maintaining patient comfort and functional efficiency (**Vig & Sarver, 2016; Figueiredo et al., 2017**). **Figure. 8**

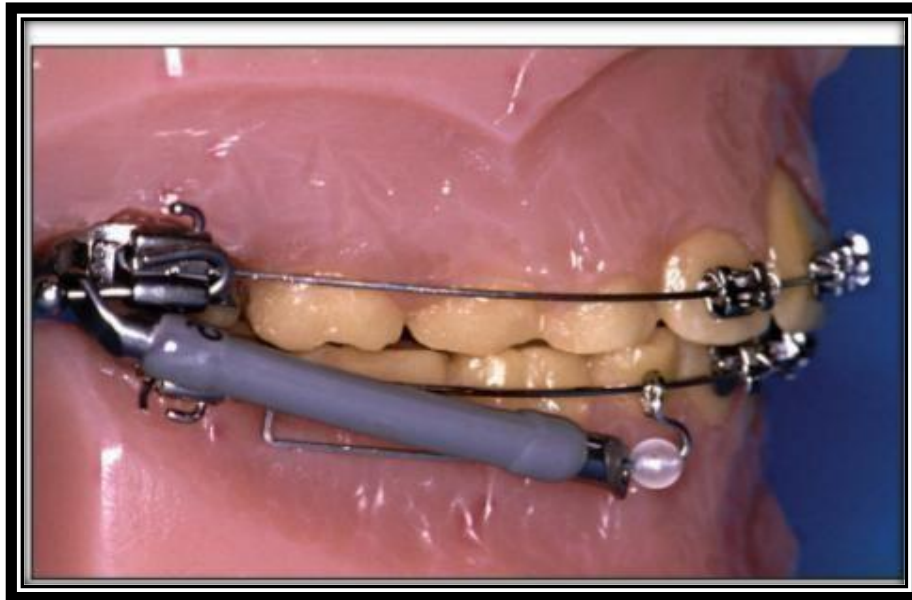


Figure 8: The Jasper Jumper Appliance. (Vig & Sarver, 2016; Figueiredo et al., 2017).

Advantages:

- **Ease of insertion and activation**, allowing efficient adjustment by the clinician
- Generates **intrusive forces on molars and incisors**, which can help in bite correction (Figueiredo et al., 2017; Vig & Sarver, 2016)

Disadvantages:

- **More prone to breakage** compared to fixed functional appliances
- **Reduced force when the mouth is slightly open**, such as in sleeping mouth breathers, potentially reducing treatment efficiency (Figueiredo et al., 2017)

Indications:

- Primarily used for **correction of Class II malocclusion**, with evaluation of craniofacial changes during treatment (Figueiredo et al., 2017).

1.6.2 Extra-Oral Appliances

A – Headgear Appliance

Headgear is an extra-oral appliance designed for growth modification, delivering orthopedic forces to influence maxillary sutures and control maxillary development. Posterior and superior extra-oral forces aim to inhibit anterior and inferior maxillary growth, while also restricting mesial and occlusal eruption of maxillary posterior teeth. The treatment goal is to allow the mandible to continue forward growth, promoting a more balanced skeletal relationship (**Proffit et al., 2018; Kapust et al., 2017**). **Figure.9**

Types of Headgear

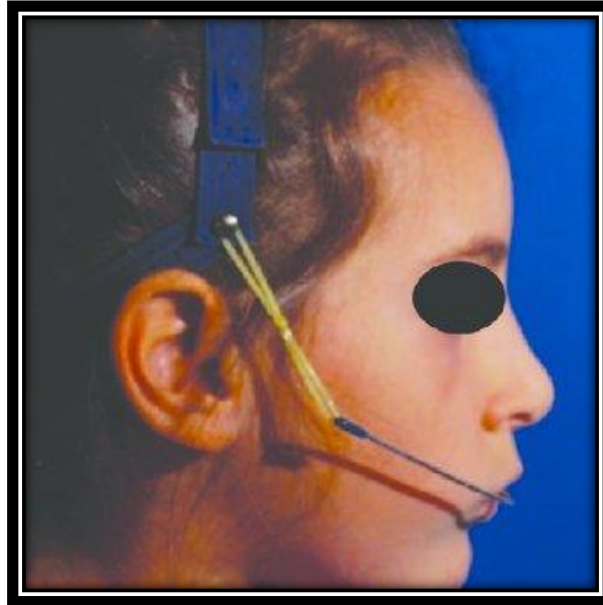
1. Facebow Headgear:

- The most common type, consisting of a large-gauge wire framework with an outer bow for extraoral attachment soldered to an inner bow, which attaches intraorally to tubes on the maxillary first molar bands.
- Used primarily for orthopedic effects on the maxilla (**Kapust et al., 2017**).

2. J-Hook Headgear:

- Composed of two curved, large-gauge wires ending in small hooks, which attach directly to the anterior part of the maxillary arch wire.
- Typically used for retraction of canines or incisors, rather than orthopedic purposes.

- Requires incorporation of all maxillary teeth into a fixed appliance with a continuous arch wire for proper function (Proffit et al., 2018).



- Figure 9: The headgear Appliance. (Proffit et al., 2018).

Indications of Headgear

Headgear appliances are indicated for several orthodontic and orthopedic purposes, particularly in growing patients:

1. **Growth modification:** Headgear can be effectively used to treat skeletal Class II malocclusions, especially when the condition is due to maxillary protrusion (anteroposterior excess of the maxilla) with normal mandibular skeletal and dental morphology. Optimal results are achieved when there is active forward mandibular growth (Proffit et al., 2018; Kapust et al., 2017).
2. **Distalization of maxillary molars,** providing skeletal and dental correction in conjunction with fixed appliances (Kapust et al., 2017).
3. **Reinforcement of intraoral anchorage,** aiding in control of tooth movement during complex orthodontic mechanics (Proffit et al., 2018).

2. Discussion

The findings of the present survey, conducted using Google Forms, provide valuable insight into current clinical perspectives regarding the use of functional appliances in orthodontic practice. The questionnaire was distributed among dental practitioners, including orthodontists and general dentists, and a total of 25 participants responded to the survey. The data were collected electronically and organized for analysis using Google Sheets, allowing efficient handling and interpretation of responses.

The majority of participants reported routine use of functional appliances, reflecting their continued relevance in the management of skeletal discrepancies, particularly in growing patients. This high rate of usage may be attributed to the well-established role of functional appliances in modifying jaw relationships during growth, as well as the accumulated clinical experience supporting their effectiveness. In the present study, more experienced clinicians demonstrated a greater tendency to incorporate functional appliances into their treatment planning, which may indicate increased confidence based on long-term clinical outcomes.

Despite the generally positive perception, patient compliance emerged as a significant concern among respondents. This finding is consistent with previous literature, which emphasizes that the success of removable functional appliances is highly dependent on patient cooperation. Inadequate compliance may reduce treatment efficiency and limit the expected orthopedic effects, thereby affecting overall treatment outcomes.

Furthermore, the variation in responses regarding the preference for functional appliances in comparison with contemporary orthodontic techniques suggests that clinical decision-making is multifactorial. Factors such as clinician experience, case selection, and the availability of modern treatment modalities may influence the choice of appliance. Although newer approaches, including fixed functional appliances and skeletal anchorage systems, have gained increasing acceptance, functional appliances remain a conservative and effective option in appropriate cases.

Overall, the results of this survey support the continued use of functional appliances in orthodontic practice. However, they also highlight the importance of careful patient selection, clinician experience, and patient motivation in achieving optimal treatment outcomes.

2.1 3D-Printed Functional Appliances

The introduction of 3D printing technology has revolutionized the fabrication of functional appliances by enabling precise customization based on individual craniofacial morphology. Unlike conventional laboratory-fabricated appliances, 3D-printed functional appliances allow accurate control over appliance dimensions, activation vectors, and fit, which can enhance patient comfort and compliance. Moreover, digital workflows reduce human error and fabrication time, facilitating rapid appliance modification during treatment. These advantages support the concept proposed by **Cozza et al. (2006)**, who emphasized the importance of appliance design in optimizing orthopedic effects. **Figure.10**



Figure.10 3D-Printed Functional Appliances. **Cozza et al. (2015)**

2.2 Hybrid Fixed–Removable Systems

Hybrid fixed-removable functional appliances represent an important evolution aimed at overcoming compliance-related limitations associated with removable appliances alone. By combining fixed anchorage elements with removable functional components, these systems ensure continuous orthopedic force application while maintaining adjustability and hygiene benefits. Clinical studies have shown that hybrid designs improve treatment efficiency and stability of skeletal correction, particularly in growing patients **Tanne et al. (2018).Figure.11**



Figure.11 Hybrid Fixed–Removable Systems. **Tanne et al. (2018).**

2.3 Miniscrew-Assisted Therapy

The incorporation of miniscrews as temporary skeletal anchorage devices has expanded the therapeutic scope of functional appliances. Miniscrew-assisted therapy allows direct force transmission to skeletal structures, minimizing unwanted dental compensations. This approach is especially valuable in borderline or non-compliant patients, as it reduces reliance on patient cooperation and enhances orthopedic outcomes. Furthermore, miniscrews provide greater control over vertical and sagittal dimensions, supporting more predictable treatment results. **Tanne et al. (2018).Figure.12**



Figure.12 Miniscrew-Assisted Therapy. **Tanne et al. (2018).**

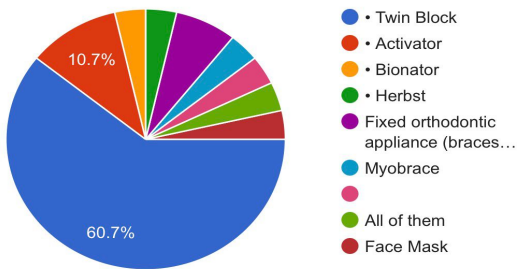
2.4 Digital Simulation and Design

Digital simulation and computer-aided design (CAD) have become integral components of modern orthodontic planning. Virtual treatment simulations enable clinicians to predict skeletal and dental responses prior to appliance fabrication, allowing optimization of appliance design and force vectors. Digital analysis also facilitates outcome assessment and patient education, improving both clinical decision-making and patient acceptance. According to **Tanne et al. (2018)**, biomechanical modeling and digital simulations play a crucial role in understanding craniofacial growth responses to functional therapy.

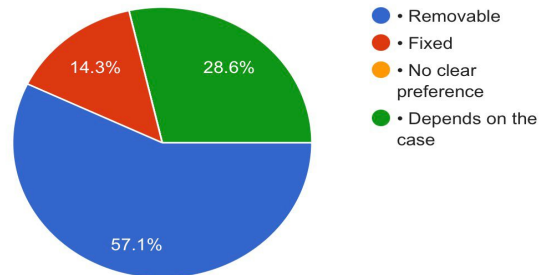
3.1. Survey regarding functional appliances uses :

A total of 28 dental practitioners responded to the questionnaire regarding the use of functional appliances in orthodontic practice. The responses were collected and analyzed using percentage-based distribution to evaluate common trends and clinical preferences.

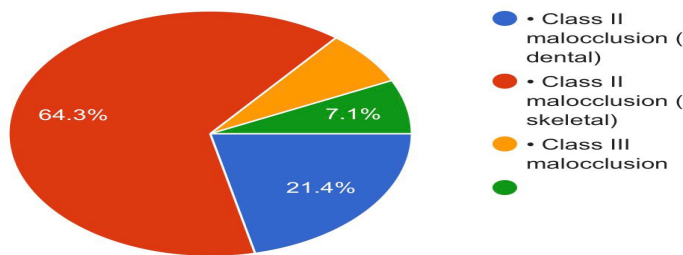
Regarding the Functional appliances used, the most commonly reported appliances were:



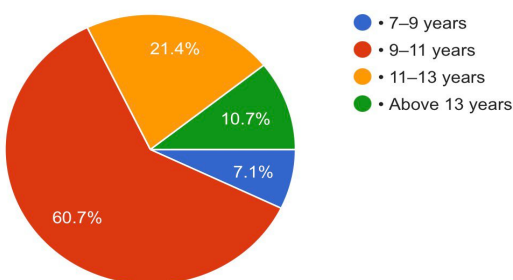
Regarding the Type appliances used, the most commonly:



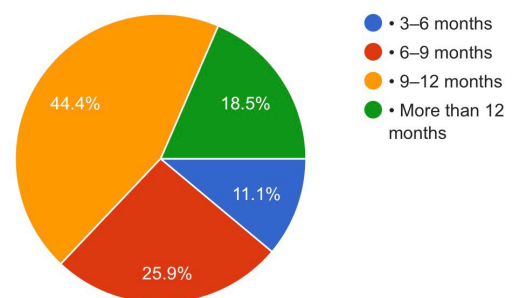
In terms of clinical indications, most respondents agreed that functional appliances are primarily used in:



Concerning the age of patients, the majority preferred using functional appliances:



As for treatment duration, most responses indicated that treatment typically lasts between:



Finally, the survey revealed that while most dentists find functional appliances effective, there are still some limitations reported such as:

- Patient cooperation
- Treatment duration
- Case selection

Conclusion & Suggestions

3.2. Conclusion

Myofunctional appliances for class II malocclusion include different types of devices and their new modifications that have proved their efficacy in the early management of growing class II patients. However, the decision of choosing a specific appliance over another is highly dependent on the origin of malocclusion and the proper evaluation of each case by the orthodontist.

All the appliances described in this paper can be useful when the clinicians use them in correct manner.

3.3. Suggestions

Some of the appliances mentioned in this project have little based evidence in clinical trials, so further research and investigations are recommended to prove their efficacy.

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