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Frankel Functional Regulator - A Literature Review

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Abstract

The functional regulator (FR) is designed to be an exercise device. Its conceptual method of action is based on medical orthopedic principles. Orthopaedists consider exercise and muscle training important factors in the normal development of osseous tissues." Frankel believes that a poor postural behaviour of the orofacial musculature is the primary etiologic factor in Class II malocclusions. He believes that the correction of a Class II malocclusion is achieved by permanently advancing the position of the mandible through muscular exercise.

Keywords: FR, Class II, Apical Bases

Introduction

The term "functional appliance" refers to a variety of removable appliances designed to alter the arrangement of various muscle groups that influence the function and position of the mandible in order to transmit forces to the dentition and the basal bone.

Typically, these muscular forces are generated by altering the mandibular position sagittal and vertically, resulting in orthodontic and orthopedic changes.

Functional appliances have been used since the 1930s. It differs from other functional appliances by protruding the mandible, ideally without contacting any mandibular teeth, and by causing an increase in both apical bases and maxillary and mandibular arch widths.

Synonyms:

- Encircle device
- Functional corrector
- Functional regulator
- Vestibular appliance
- Oral gymnastic appliances
- Orofacial orthopedic appliance

Frankel Philosophy

1. Vestibular area of operation
2. Sagittal correction via tooth borne maxillary anchorage
3. Differential eruption guidance

4. Minimal maxillary basal effect
5. Periosteal pull by buccal shields and lip pad

1. Vestibular area of operation

Shields of the appliance extend to the vestibular area and this prevents the abnormal muscle function.

Frankel appliance is confined to the oral vestibule and hold away, the buccal and labial musculature from the dentition in those areas in which the pressure on the dentoalveolar structures has restricted the outward development of these structures.

2. Sagittal correction via tooth borne maxillary anchorage

Appliance is fixed on the upper arch by grooves mesial to the 1st permanent molar and distal to the canine in the mixed dentition period.

Presence of the lingual pad acts as stimulator and helps in the forward posturing of the mandible.

3. Differential eruption guidance

Frankel is placed on the upper teeth. Mandibular posterior teeth are free to erupt and their unrestricted upward and forward movement contributes to both vertical as well as horizontal correction of the malocclusion.

4. Minimal maxillary basal effect

Downward and forward growth of maxilla seems to be restricted, even though lateral Maxillary expansion in seen.

5. Periosteal pull by buccal shields and lip pad

Presence of buccal shields and lip pads exert the periosteal pull which helps in bone formation and lateral expansion of the maxillary apical base.

Mode of Action Of Functional Regulator

- Increase in transverse and sagittal direction.
- Increase in vertical direction.
- Muscle adaptation.
- Mandibular forward positioning.

1. Increase in transverse and sagittal direction - by use of buccal shields and lip pads.

2. Increase in vertical direction - by allowing the lower molar to erupt freely because appliance is fixed to the upper arch.

3. Muscle adaptation - Development of new patterns of motor function by buccal shields and lip pads of FR can be achieved by

a) Massaging the soft tissues

b) Loosening the tight muscles

c) Improving the blood circulation

d) Improving muscle tonicity

4. Mandibular forward positioning- Position of mandible can be changed by gradual training of the protractor and retractor muscles followed by condylar adaptation. Presence of the lingual pad acts as stimulator and helps in the forward posturing of the mandible.

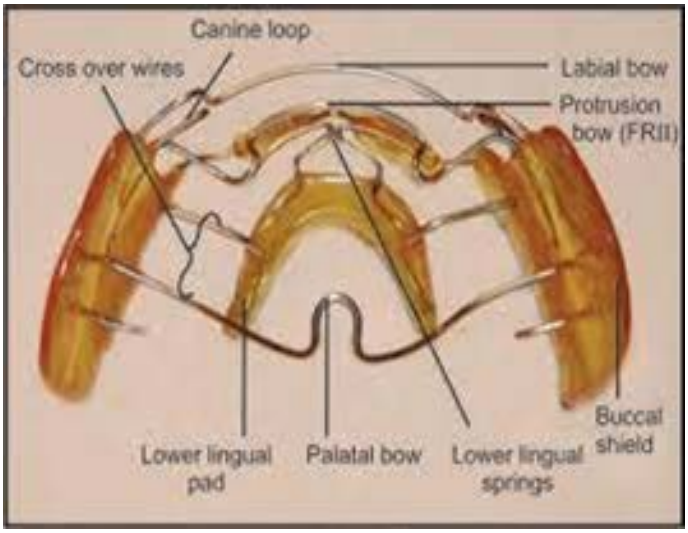
Indications

- ✓ Mixed dentition period with growth spurts.
- ✓ Skeletal class II malocclusion with retrognathic mandible (Positive VTO).
- ✓ In a horizontal or neutral growth cases.
- ✓ Class III malocclusions.
- ✓ Bimaxillary protrusion and open bite problems.

Contraindications

- Thumb sucking habit.
- Severe dentoalveolar problems in permanent dentition.
- Uncooperative patients.
- Class I malocclusion with severe crowding
- A Vertical growth patterns.
- Labial tipping of the lower incisors.
- Class II relationship caused by maxillary prognathism.

Components of Frankel Appliance



Acrylic components	Wire components
Buccal shields	Palatal bow
Lip pads	Labial bow
Lower lingual pad	Canine extensions
	Upper lingual wire
	Lingual crossover wire
	Support wire for lip pads
	Lower lingual springs

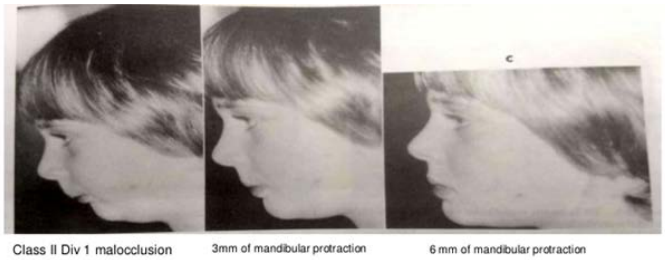
Types of Frankel Appliance

- FR I -Class I and Class II div 1 malocclusion
- FR Ia- Class I with deepbite, Class I with minor to moderate crowding.
- FR Ib- Class II div 1- Overjet <5mm
- FRIc Class II div 1- Overjet >7mm
- FR II - Class II div 1 and div 2
- FR III- Class III
- FR IV- Open bite
- FR V - Vertical maxillary excess+ high mandibular plane angle in long face patients (along with headgear)

Clinical Procedures

- Visual Treatment Objective
- Impression Making
- Construction bite

Visual Treatment Objective



Impression Making

- A custom fabricated tray, with proper beading to improve details.
- Successful therapy depends on the fit & comfort of the appliance.
- Impressions should reproduce the whole alveolar process to the depth of the sulci, including maxillary tuberosities.

Construction Bite

- Advancement only by 2.5-3mm.
- Vertical opening only large enough to allow crossover wires through the interocclusal space without contacting the teeth anteriorly, not more than end-to-end bite.
- "Step-by-step" activation produces a better and more continuous tissue reaction, rather than the "great leap forward."

Modifications

- Modified function regulator.
- Capped Frankel appliance.
- Hybrid functional appliance (FR 2 and activator combination)

Conclusion

In the growing phase, FR II appliance of Frankel is an effective method in achieving the following:

- Initial correction of anteroposterior maxillo-mandibular relationship,
- Increase in LAFH without altering the facial growth pattern,

- Pronounced vertical development of mandibular molars,
- Reduction in the overjet and overbite and
- An improvement in the molar relationship,
- Retroclination of maxillary incisors, and proclination of mandibular incisors.

References

1. Dentofacial orthopedics with functional appliances. Graber, Rakosi, Petrovic.
2. McNamara JA, Bookstein FL, Shaughnessy TG. Skeletal and dental changes following functional regulator therapy on Class II patients. American journal of orthodontics. 1985 Aug 1;88(2):91-110
3. Falck F, Fränkel R. Clinical relevance of step-by-step mandibular advancement in the treatment of mandibular retrusion using the Fränkel appliance. American Journal of Orthodontics and Dentofacial Orthopedics. 1989 Oct 1;96(4):333-41.
4. McNamara JA, Howe RP, Dischinger TG. A comparison of the Herbst and Fränkel appliances in the treatment of Class II malocclusion. American Journal of Orthodontics and Dentofacial Orthopedics. 1990 Aug 1;98(2):134-44.
5. Hamilton SD, Sinclair PM, Hamilton RH. A cephalometric, tomographic, and dental cast evaluation of Fränkel therapy. American Journal of Orthodontics and Dentofacial Orthopedics. 1987 Nov 1;92(5):427- 34.
6. Owen 3rd AH. Modified function regulator for vertical maxillary excess. Journal of clinical orthodontics: JCO. 1985 Oct;19(10):733-49.
7. Vig PS, Orth D, Vig KW. Hybrid appliances: a component approach to dentofacial orthopedics. American Journal of Orthodontics and Dentofacial Orthopedics. 1986 Oct 1;90(4):273-85.
8. Haynes S. A cephalometric study of mandibular changes in modified function regulator (Frankel) treatment. American Journal of Orthodontics and Dentofacial Orthopedics. 1986 Oct 1;90(4):308-20.
9. The effects of Frankel's function regulator (FR-4) therapy on the treatment of Angle Class I skeletal anterior open bite malocclusion. Elif Erbay, DDS, MS, Mustafa Ulgen, DDS, Dr.med.dent. AM J ORTHOD DENTOFAC ORTHOP 1995; 108:9-21.
10. Functional appliances. Sukhpal Kaur, Sanjeev Soni, Anil Prashar, Naveen Bansal, Jaskaran Singh Brar, Maninderdeep Kaur. Year: 2017 Volume: 9 Issue: 4 Page: 276-281.