

EARLY TREATMENT OF SKELETAL CLASS II BY FRÄNKEL FUNCTIONAL REGULATOR

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Abstract: In this case 7-year-old boy with severe distal bite caused by mandibular retrognathism was treated by Fränkel functional regulator type Ic.

Aim: The aim of this paper was to show main skeletal and dental effects of Fränkel functional regulator type I in early treatment of skeletal distal bite. Appropriate timing for usage of functional appliance can successfully correct mandibular retrognathism and avoid later prolonged orthodontic treatment.

Material and method: In this case boy in early mixed dentition with skeletal Class II was treated. Before treatment clinical examinations, study cast analysis, intraoral and extraoral photos, orthopantomogram and lateral cephalogram have been done. Active phase of treatment lasted 18 months. During this period patient wore an appliance continuously for 24 hours except during meals. An appliance was made on the basis of registered construction bite in position of posterior teeth in Class I. Patient activated screws in appliance once in 10 days. Lateral cephalogram, intraoral and extraoral photos have been done on the end of active phase of orthodontic treatment.

Results and conclusion: Before treatment patient had severe Class II with deep bite and overjet of 11mm. Parameters on lateral cephalogram were: SNA 83°, SNB 77°, ANB 6°, Wits appraisal 9mm, SpP/MP 27°, FMA 21°, FMIA 59°, IMPA 100°, I/SpP 117°, Bjork 390°, Jarabak ratio 68%. After active phase of treatment patient had stable occlusion in Class I, reduced overbite and overjet of 3mm. At the end of the treatment measured parameters on the lateral cephalogram were: SNA 83°, SNB 79°, ANB 4°, Wits appraisal 0mm, SpP/MP 25°, FMA 20°, FMIA 59°, IMPA 101°, I/SpP 115°, Bjork 390°, Jarabak ratio 68%. Fränkel functional regulator is very successful appliance for early treatment of skeletal distal bite, before pubertal growth spurt. This appliance causes skeletal and dentoalveolar changes and contributes to the correction of swallowing and speech.

Key words: Fränkel functional regulator, skeletal distal bite, mandibular retrognathism, functional appliance.

1. INTRODUCTION

Skeletal distal bite is a common malocclusion that makes 27% of all skeletal malocclusions with the highest incidence in white population.^{1,2} The cause of this malocclusion is changed jaw-base relationship due to maxillary prognathism, mandibular retrognathism or the combination of the two. Etiology of distal bite is multifactorial, predominantly it is genetics, but it can be caused by congenital anomaly,

lies, dysfunction of endocrine glands, as well as persistence of bad habits.^{3,4} Skeletal distal bite is often associated with irregular orofacial functions, swallowing and speech, as well as with temporomandibular dysfunctions.⁵

Treatment of skeletal distal bite is diverse and depending of the age of the patient, it can include active appliances, functional appliances, fixed appliances or even orthognathic surgery. Ideal time for treatment of growth modification is period of early

mixed dentition, before pubertal growth sprut.

Today there is a lot of functional appliances that can be used in treatment of skeletal distal bite and we can divide them in two groups, teeth worn and tissue worn appliances. Teeth-worn appliances activate orofacial muscles and cause anterior displacement of mandible. That group of appliances consists of activator, Balter's Bionator, Twin block, Herbst appliance, Hotz plate and vestibular plate. The only tissue worn functional appliance is Fränkel functional regulator. This appliance corrects occlusal morphology, orofacial functions and facial aesthetics.⁶ There are four types of Fränkel functional regulator different with different indications for use and design. Fränkel functional regulator type I (FR-I) is used for treatment of skeletal distal bite. Main effects of FR- I are: anterior displacement and stimulation of sagittal growth of the lower jaw, suppression of the

sagittal growth of the upper jaw, elimination of the pressure, application of the pressure, application of the pulling force and continuous exercise of orofacial muscles.⁷ FR-I has 3 subtypes (FR-Ia, FR-Ib, FR-Ic). FR-Ia is used in treatment of Class II subdivision I with overjet less than 5mm, FR-Ib for overjet from 5 to 7mm, while FR-Ic for overjet more than 7 mm.

2. MATERIAL AND METHOD

A 7-year-old patient was diagnosed with skeletal distal bite. Clinical examinations, study cast analysis, intraoral and extraoral photos, orthopantomogram and lateral cephalogram have been done before the treatment. Clinical examination showed convex profile, mandibular retrognathism, accentuated mentolabial sulcus, and changed position and relation between upper and lower lip (Fig. 1). Intra-

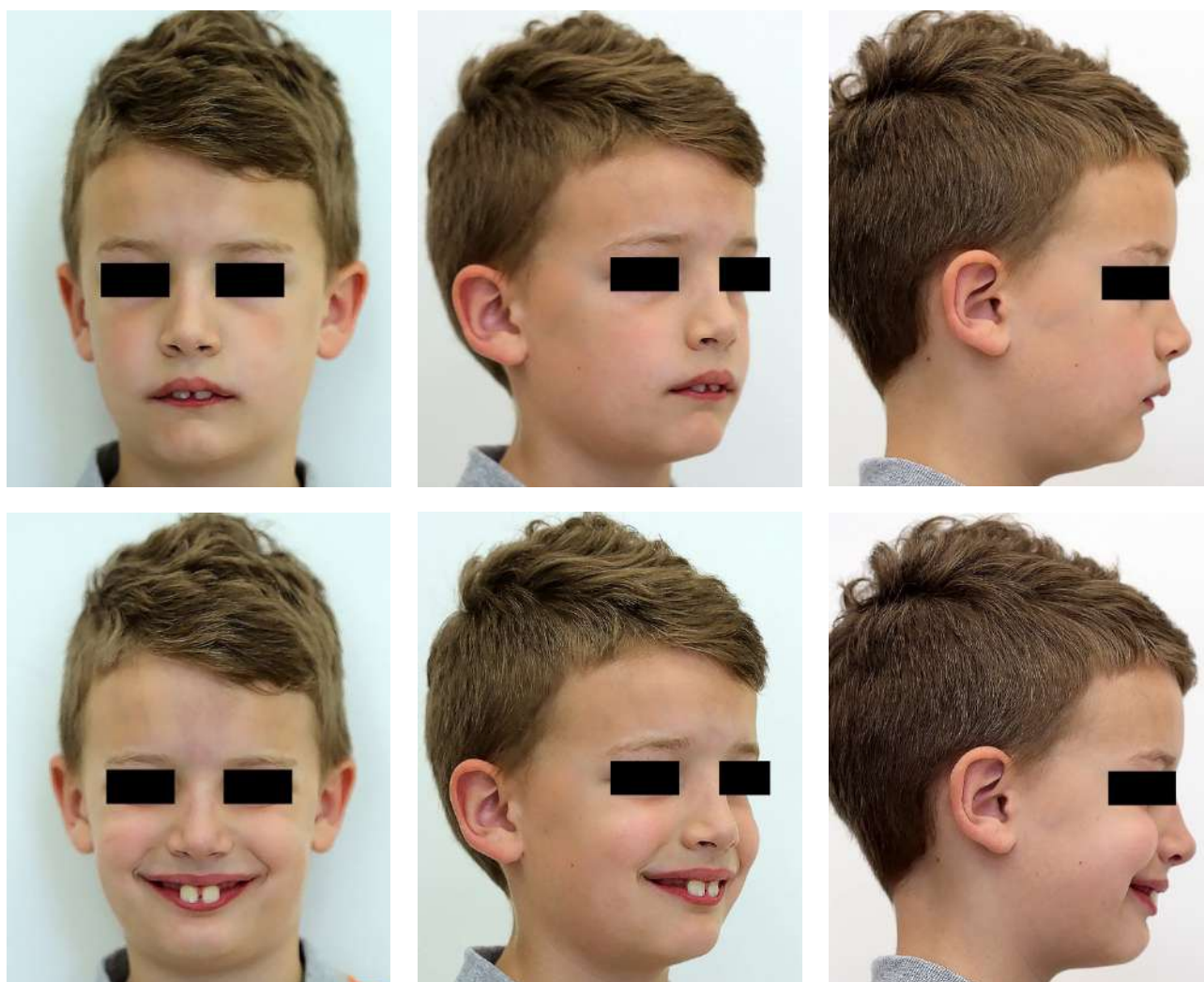


Figure 1. Extraoral photos of patient before orthodontic treatment



Figure 2. Intraoral photos of patient before orthodontic treatment



Figure 3. Lateral cephalogram before and after orthodontic treatment with Fränkel functional regulator type Ic

oral examination showed increased overjet and overbite, and Class II occlusion (Fig. 2). Lateral cephalometric analysis indicated maxillary normognathism (SNA 83°), mandibular retrognathism (SNB 77°), skeletal Class II (ANB 6°, Wits appraisal 9mm), increased B angle (SpP/MP 27°), hypodivergent growth pattern (FMA 21°), proclined lower incisors (FMIA 59°, IMPA 100°), proclined upper incisors (I/SpP 117°), forward facial rotation (Bjork's sum 390°, Jarabak ratio 68%) (Fig. 3). The patient had an overjet of 11mm, so it was decided to treat him with

Fränkel functional regulator type Ic (Fig. 4). The registered construction bite was done with posterior teeth in Class I relation. Patient was given instructions how to handle, wear and clean the appliance. The first two weeks the patient wore the appliance for 2 to 4 hours, then 4 to 6 hours for one week and afterwards 24 hours, except during meals. Patient was told to turn the screws simultaneously once in 10 days. Check ups were done every 4 to 6 weeks. The active phase of treatment lasted for 18 months and the retention phase for 24 months, during which the

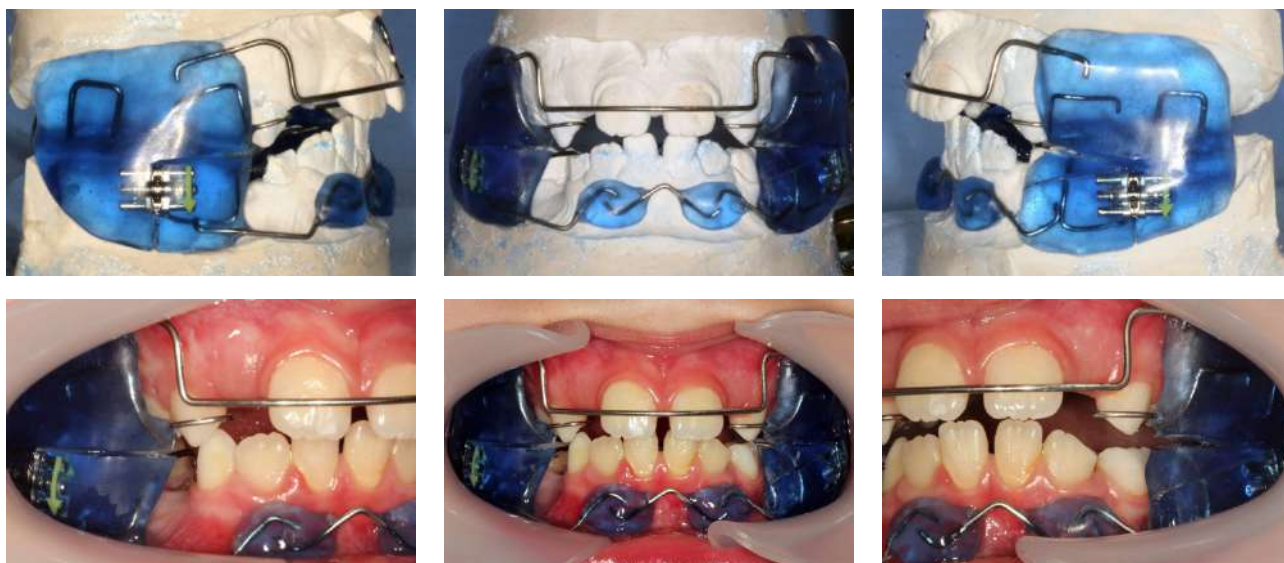


Figure 4. Fränkel functional regulator type Ic

appliance was only worn during night to preserve the acquired results.

At the end of the active phase of the treatment the lateral cephalogram, intraoral and extraoral photos were made to assess the results of the treatment.

3. RESULTS AND CONCLUSION

Facial esthetics were improved, the profile was less convex, normal position and relation of the lips was acquired, as well as less accentuated

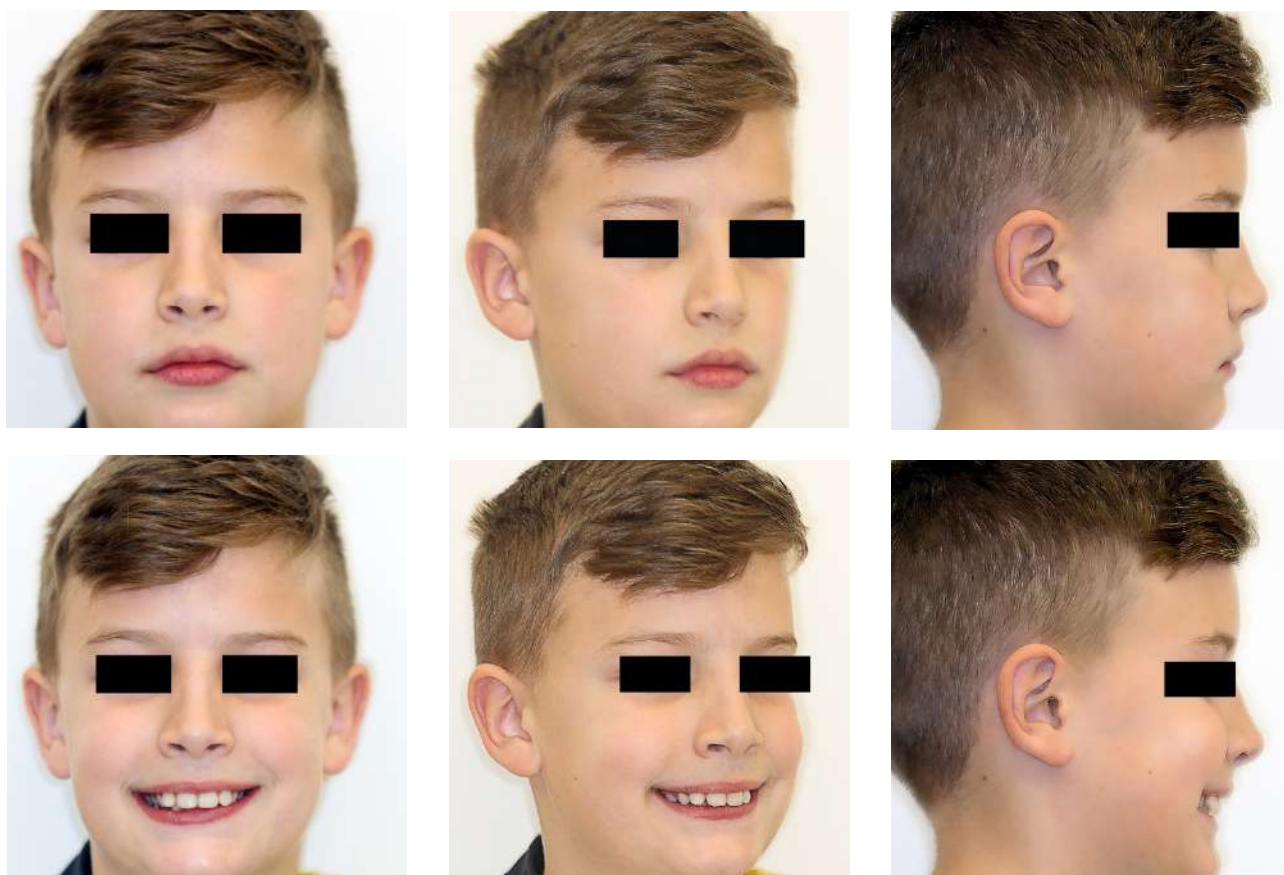


Figure 5. Extraoral photos of patient after orthodontic treatment with Fränkel functional regulator type Ic



Figure 6. Intraoral photos of patient after orthodontic treatment with Fränkel functional regulator type Ic

mentolabial sulcus.(Fig. 5) The patient had stable occlusion in Class I, reduced overbite and overjet of 3mm.(Fig. 6) Lateral cephalogram at the end of the active phase showed maxillary normognathism (SNA 83°), mandibular normognathism (SNB 79°), skeletal Class I (ANB 4°, Wits appraisal 0mm), normal value of B angle (SpP/MP 25°), hypodivergent growth pattern (FMA 20°), proclined lower incisors (FMIA 59°, IMPA 101°), proclined upper incisors (I/SpP 115°), forward facial rotation (Bjork's sum 390°, Jarabak ratio 68%) (Fig.3) Treatment with Fränkel functional regulator type Ic led to correction of skeletal Class II to skeletal Class I due to forward movement of mandible, decrease of vertical interjaw angle, oral inclination of upper incisors and vestibular inclination of lower incisors, without changes in facial rotation.

Treatment of severe skeletal distal bite in early mixed dentition can be successfully treated with Fränkel functional regulator type I. This appliance corrects occlusal morphology, orofacial functions and facial esthetics.

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РАНА ТЕРАПИЈА II СКЕЛЕТНЕ КЛАСЕ FRÄNKEL-ОВИМ РЕГУЛАТОРОМ ФУНКЦИЈЕ

Сажетак: Дечак, старости седам година, са дисталним загрижајем узрокованим мандибуларним ретрогнатизмом је третиран Fränkel–овим регулатором функције тип Ic.

Циљ: Циљ овог рада је да се прикажу главни скелетни и дентални ефекти Fränkel–овог регулатора функције тип I у раној терапији скелетног дисталног загрижаја. Применом функционалних апарата у раној мешовитој дентицији може се успешно кориговати мандибуларни ретрогнатизам и избећи каснија пролонгирана ортодонтска терапија.

Материјал и метод: Ово је приказ терапије дечака у раној мешовитој дентицији са скелетно II класом. Пре почетка терапије урађен је клинички преглед, анализа студијских модела, интароралне и екстраоралне фотографије, ортопантограм и профилни цефалограм. Активна фаза терапије трајала је 18 месеци. Током овог периода пацијент је носио апарат 24 сата дневно осим током оброка. Апарат је израђен на основу конструкционог загрижаја у односу I класе. Пацијент је окретао шрафове једном у 10 дана. На крају активне фазе терапије урађен је профилни цефалограм, интраоралне и екстраоралне фотографије.

Резултати и закључак: Пре терапије пацијент је имао изражен дисталан и дубок загрижај и инцизални размак од 11 mm. Параметри на профилном цефалограму су били: SNA 83°, SNB 77°, ANB 6°, Wits 9mm, SpP/MP 27°, FMA 21°, FMIA 59°, IMPA 100°, I/SpP 117°, Bjork 390°, Jarabak 68%. После активне фазе терапије пацијент је имао стабилну оклузију I класе, смањену дубину преклопа и инцизални размак од 3mm. На крају терапије параметри на профилном цефалограму су били: SNA 83°, SNB 79°, ANB 4°, Wits 0mm, SpP/MP 25°, FMA 20°, FMIA 59°, IMPA 101°, I/SpP 115°, Bjork 390°, Jarabak 68%. Регулатор функције по Fränkel-у је апарат избора у раној терапији скелетног дисталног загрижаја пре пубертетског скока раста. Овај апарат доводи до денталних и скелетних промена и корекције гутања и говора.

Кључне речи: регулатор функције по Fränkel-у, скелетни дисталан загрижај, мандибуларни ретрогнатизам, функционални апарат.

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