



## TREATMENT OF EARLY CLASS III MALOCCLUSION WITH BUÑO APPLIANCE <sup>‡</sup>

### ERKEN SINIF 3 MALOKLUZYONUN BUÑO APAREYİ İLE TEDAVİSİ<sup>‡</sup>

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#### ABSTRACT

Skeletal Class III malocclusion is one of the most challenging, complex and difficult problems to treat. Functional orthopedic appliances can produce favorable outcomes during early mixed dentition in cases with Class III malocclusion. The purpose of this case report was to present a successfully treated 8-years-old female patient having skeletal Class III malocclusion due to maxillary retrusion by means of a simple Class III corrector, the bimaxillar prognathism upper plate according to Buño.

**Key words:** Class III malocclusion, Class III corrector

#### ÖZ

İskeletsel Sınıf III malokluzyon tedavisi en zor ve karmaşık problemlerden biridir. Fonksiyonel ortopedik apareyler erken karışık dişlenme dönemindeki Sınıf III malokluzyonlu vakalarda olumlu sonuçlar oluşturabilir. Bu vaka raporunun amacı, maksiller retrüzyona bağlı olarak gelişen iskeletsel Sınıf III malokluzyonlu 8 yaşındaki bir kız çocuğunun basit bir Sınıf III düzeltme apareyi ("Buno apareyi) ile başarılı şekilde tedavisini göstermektir.

**Anahtar Kelimeler:** Sınıf III malokluzyon, Sınıf III

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#### INTRODUCTION

Skeletal Class III malocclusion is one of the most challenging, complex and difficult problems to treat. Majority of skeletal Class III malocclusion displays retrognathic maxilla in combination with normal or prognathic mandible. Many orthodontists prefer waiting for orthognathic surgery until the completion of mandibular growth. Unfortunately, this treatment option may affect psychology of the patients and their parents negatively until the surgery. Instead of waiting for orthognathic surgery, early intervention to Class III malocclusion is suggested by many authors as a better treatment choice.<sup>1,2</sup> Some authors<sup>3</sup> suggested that functional appliances produce favorable outcomes on Class III malocclusion during early mixed dentition.

Among various functional appliances, Frankel III appliance is still very popular among functional orthopedic appliances. Frankel III appliance may stimulate maxillary growth and inhibit mandibular growth by counteract forces exerted by surrounding muscles.<sup>4-6</sup> However, Frankel III appliance has very bulky and complex structure and these factors may reduce patient's cooperation and restrict treatment outcomes.

Therefore, a simple Class III corrector, the bimaxillar prognathism upper plate according to Buño, was used in our case to stimulate maxillary growth and to correct anterior cross bite.

#### Diagnosis and Treatment Planning

An 8-years-old girl applied to our clinic with chief concern of "My classmates mocks my smile and



underbite". Her medical history revealed no systemic disease. Extra-oral examination showed a slight mid-face deficiency and concave profile (Figure 1). Her intraoral examination showed a Class III malocclusion, minor crowding at lower arch and edge-to-edge incisor relationship.

Cephalometric evaluation showed skeletal Class III relationship (ANB Angle,  $-1.4^\circ$ ) due to underdeveloped maxilla (SNA angle,  $77^\circ$ ). The patient showed normal vertical growth pattern (FMA,  $22.3^\circ$ ). Maxillary and mandibular incisors' inclinations within the normal ranges (U1-to SN,  $105.3^\circ$  and IMPA,  $88.8^\circ$ ) (Table1). The panoramic radiograph showed early mixed dentition stage.

Although the ideal treatment plan would have been an early maxillary protraction with temporary anchorage devices, the patient and her parent refused this treatment option. Therefore, we proposed an alternative orthopedic treatment option with a simple appliance design to alleviate the occlusal problem, correct the skeletal discrepancy and correct facial imbalance.

Table 1. Cephalometric measurements at pre- and post-treatment.

	Norm	Pre-treatment	Post-treatment
SNA°	82	77	78.4
SNB°	80	78.4	78.3
ANB°	2	-1.4	0.1
FMA°	25.7	22.3	22.4
IMPA°	95	88.8	87.5
U1-NA(mm)	4.3	4.8	5.8
U1-NA°	22.8	28.3	27.7
L1-NB (mm)	4	3	3.2
L1-NB°	25.3	21.5	19.7

### Treatment Objective

Treatment objectives are to produce a more favorable environment for maxillary growth, normal overjet and overbite, and to achieve a balanced skeletal and soft tissue profile.

### The Appliance Design and Treatment Progress

We preferred a simple Class III corrector, named the bimaxillar prognathism upper plate according to Buño, for treatment due to its simplicity, effective and hygienic structure. The design and fabrication of the appliance explained in details in the web source of Dentaurum Company.<sup>7</sup> The following text explaining design and fabrication of the appliance and 3 figures (Figure 2, 3, and 4) showing the appliance reproduced with kind permission of the company.



Figure 1. Pretreatment extra-oral and intra-oral photographs, cephalometric film and orthopantomography.

The upper plate of the appliance is anchored with simple retention thorns. Loops are bent on both sides of the inter-maxillary bow. The part, which lies on the lower incisors, is covered with a spring and a plastic tube. The labial pads are similar to those of Fränkel's function regulator although in the center they are not connected (Figure 2).

The upper plate is furnished with a strong acrylic lingual shield. This acrylic shield should not touch the mandible. Therefore the models are covered with wax in the area of the lower teeth and of the lingual shield. Through this free space to the lingual shield and the inter-maxillary bow, the mandible is supposed to be restricted or even moved backwards (Figure 3)

In order to distract the tongue from the incisors, this bimaxillar prognathism plate also includes a Coffin spring (Figure 4).



Figure 2. Wire bends and wax coverage from occlusal view (With the kind permission of Ursula Wirtz and Dentaurum).



Figure 3. The Class III corrector, The Buno appliance (With the kind permission of Ursula Wirtz and Dentaurum).

The patient was instructed to wear the appliance 24 hours daily except during eating and teeth brushing (Figure 5). The patient showed a good cooperation during the treatment, although her cooperation reduced in some visits. The patient used the appliance for 10 months. Then, the patient was instructed to wear the appliance 8 hours daily for maintenance of the treatment outcomes for 12 months.



Figure 4. Anterior view of the appliance seated on the orthodontic stone casts (With the kind permission of Ursula Wirtz and Dentaurum).



Figure 5. Intra-oral anterior view of the appliance seated on the mouth.

### Treatment Results

At the end of 10 months of treatment, upper lip retrusion was improved and the patient exhibited a balanced facial profile and pleasant smile. The anterior cross bite was corrected (Figure 6). Post-treatment photographs and cephalometric analysis confirmed significant improvements in the profile. Maxilla moved anteriorly approximately 1.5 mm during the treatment (SNA angle increased from 77 to 78.4 degrees), intermaxillary jaw discrepancy reduced due to the increase in the SNA angle. No prominent affect was observed in the mandibular structures. For example, SNB angle and mandibular plane angle showed minimal changes during the treatment. Sufficient overjet and overbite is achieved during the treatment (Overjet/overbite increased from 0 mm to 2-2.5 mm). Upper and lower incisors showed slight proclination and retroclination, respectively.

At the end of 12 months of observation period, the outcomes obtained after the treatment was maintained (Figure 7).



Figure 6. Post-treatment extra-oral and intra-oral photographs, cephalometric film and orthopantomography.



Figure 7. Post-retention extra- and intra-oral photographs.

### DISCUSSION

One of the most confusing conditions in orthodontics is diagnosis and treatment of the subjects with a Class III malocclusion. Children with a Class III malocclusion may have an underdeveloped maxilla, an overdeveloped mandible, or a combination of both. Previous studies have reported that 32–63% of the patients with skeletal Class III malocclusion have a maxillary deficiency or its combination with excessive mandibular growth.<sup>8-10</sup> Orthopedic, functional, or orthodontic treatments or combination of these are among the treatment options of Class III cases.

Early intervention of Class III malocclusion is still one of the most controversial subjects in orthodontics.<sup>10-12</sup> The major obstacles to achieve a balanced profile in the cases are additional excessive mandibular growth and genetic pattern.<sup>13</sup> Therefore, some authors claimed that many Class III patients have potential to candidates for orthognathic surgery<sup>3</sup> and they advocated orthognathic surgery for the patients. In contrast, others suggested early orthopedic treatment.<sup>1,2</sup>

We preferred Buno appliance for forward growth stimulation of maxilla of the patient, since it has superiorities over to Frankel III appliance such as more simple and comfortable for the patient. In addition, labial pads of Buno appliance can activate separately and there is no connection between the labial pads, unlike FR-3 appliance. Labial pads of Buno appliance acted as vestibular shields of the FR-3 appliance, and labial pads of this appliance showed a great influence on skeletal and dental development of the maxilla. Labial pads of Buno appliance remove muscle forces in the labial areas that restrict maxillary skeletal growth, thereby providing an environment to maxilla for normal or enhanced skeletal growth.

The patient exhibited a balanced facial profile, pleasant smile, and normal overjet and overbite after the treatment (Maxilla moved 1.5 mm anteriorly, overjet/overbite increased from 0 mm to 2-2.5 mm).

Finally, this appliance produced promising clinic and cephalometric outcomes in the present case. Soft tissue profile of the patient is changed dramatically.

## CONCLUSIONS

The orthopedic appliance used in the present case produced favorable improvements in Class III patients with mixed dentition stage and retrusive maxilla and accompanying anterior cross-bite, and the treatment results were remained stable during the retention period.

**NOT: Çalışmada herhangi bir yazar, kurum ya da kuruluş ile çıkar çatışması içerisinde bulunmamaktadır. Makale daha önce hiçbir yerde yayınlanmamış ve yayınlanmak üzere işlem görmemektedir**

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