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*Early Treatment of a Class III Patient with Chincup: A Case Report**

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Case Report

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History

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ABSTRACT

Class III malocclusions are usually related to growth and mandibular posture. The mixed dentition stage of development may provide a useful opportunity to embark upon orthodontic therapy to correct a Class III malocclusion. Chin cap is a useful appliance in growingpatients that exhibit mandibular prognathis. This case report aim to describe an early treatment of a Class III malocclusion by using a chincup. This case report presents a 9 year-old girl with a functional Class III malocclusion and anterior crossbite. She has treated by using chincup for 10 months. The occlusion was elevated with a maxillary appliance, and the maxilla was freed from the restriction of the mandible. In this way, the maxilla was able to continue its development and the growth of the mandible was limited by chincup. Anterior cross-bite was corrected and a positive overjet were achieved. Facial profile was improved. While posterior rotation of the mandible was expected with the effect of the chincup, SN-GoGn angle didn't change in this case. At the end of treatment, a class I relationship and a smooth soft tissue profile were obtained.

Keywords: Chincup, Class III Malocclusion, Early Orthodontic Treatment, Anterior Crossbite Treatment.

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Introduction

Class III malocclusions can be associated with the mandibular posture and growth pattern of the individual. Various skeletal and dental compensation components play a role in the etiology of Class III malocclusion.[1] Malocclusion formation may manifest as maxillary retrognathism, mandibular prognathism, protrusive maxillary dentition, retrusive mandibular dentition, and a combination of these.[2] Class III malocclusion can be clinically divided into two groups: (a) "false or functional Class III"; mandibular closure interferes early with the muscle reflex, resulting in Class IIIand (b) "true Class III"; skeletally Class III is observed.[3]

Forward displacement of the mandible due to early contact causes anterior crossbite, which is a common clinical feature of false Class III and skeletal Class III malocclusions.[4,5] Skeletal and dent-alveolar components differentiate between true Class III and false Class III malocclusion. Patients with true Class III malocclusion show a skeletal Class III pattern characterized by an undersized maxilla, protruding mandible, or a combination of these two conditions. In patients with pseudo-Class III malocclusion, skeletal Class I malocclusion accompanying normal maxilla and mandible dimensions is observed.[6]

In general, the profile of patients with Class III malocclusion is concave and the nasomaxillary area is retrusive. In these patients, protrusion of the lower lip is evident. The mandibular arch is wider than the maxillary arch, and negative overjet and reduced overbite are among the clinical findings.[7,8]

Orthodontists should consider the growth and developmental period of the patient and the skeletal factors that cause the anomaly when treating a patient with Class III anomaly. Between growth periods the mixed dentition stage is among the most appropriate periods to initiate the necessary treatment to correct a Class III malocclusion. Class III malocclusions that are thought to respond to functional therapy should be treated when growth is active. The chin cap is the first-choice appliance in the treatment of patients with active growth development characterized by mandibular prognathia. Chincup allows us to achieve orthopedic effect as in the treatment with Class III activator and face mask.[9]

This case report aims to describe the early treatment of a Class III malocclusion using a chincup.

Case Report

Case History

A 9-year-old female patient was admitted to the Department of Orthodontics, Faculty of Dentistry, Ankara University, with a complaint of anterior mandible by her family. The patient, who did not have a similar anomaly in her family history, did not have bad habits such as thumb

sucking, lip biting, and using a long-term bottle. The patient was breathing through her nose and there was no respiratory problem. Her medical history was clear and she had no signs or symptoms of temporomandibular joint dysfunction. The patient's puberty symptoms were negative and the patient was in the prepubertal period. (Figure 1)

According to clinical examination, dental Class III molar relationship was present. There was 1 mm left deviation in the lower midline. The patient has a straight profile. The freeway area was 4 mm. The DeNevreze maneuver was positive and the patient was able to move the lower jaw head-on without external intervention.[10] (Figure 2)

According to the model analysis; There were -2 mm overjet, 2 mm overbite, and anterior crossbite (Figure 3). According to Moyers analysis[11]; Maxillary arch length deviation was 0 mm and Mandibular arch length deviation was 1.5 mm. (Figure 4)

According to the cephalometric analysis[12], she had a Class I skeletal structure (ANB= 0˚). There was a normodivergent growth pattern (GoGn/SN= 30˚). According to Steiner soft tissue analysis[13], the upper lip was 1 mm retrusive and the lower lip was 2.5 mm protrusive. (Table 1).

According to the hand and wrist radiographs of the female patient with MP3= skeletal stage, it was observed that 86.2% of the skeletal development was completed (Figure 5).

According to the panoramic radiograph taken, our patient was in the early mixed dentition period. There were no missing teeth. (Figure 6)

Positive DeNevreze maneuver[10] and skeletal Class I pattern showed us that this patient was in the Pseudo Class III group.[3]

Treatment goals for this patient were to free the maxilla from confinement of the mandible, to create an ideal Angle class I molar relationship, and an ideal overjet and overbite.

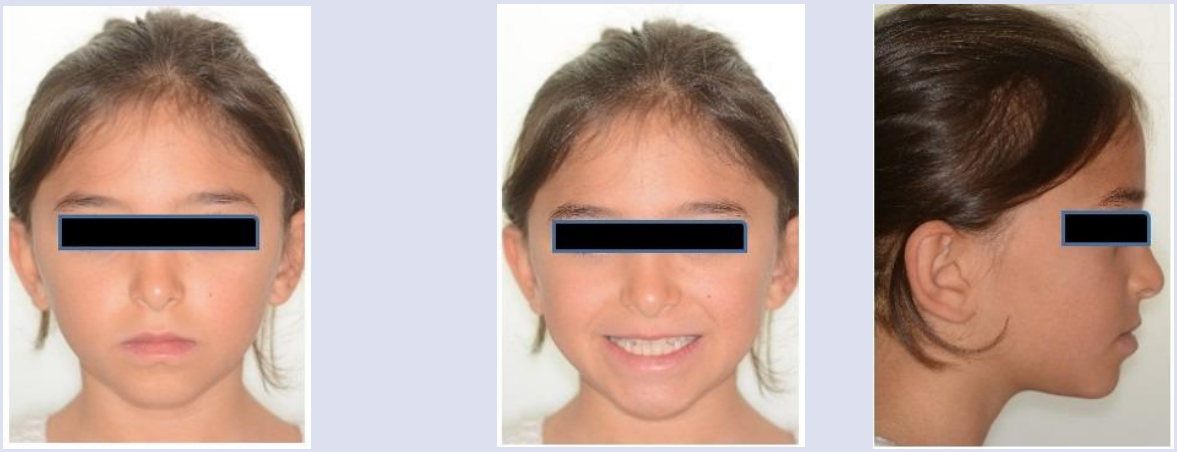

Figure 1. (a) Pretreatment photographs (b) Frontal view (c) Lateral view

Figure 2. Pretreatment intraoral photographs

Figure 3. Pretreatment overjet and overbite photographs.

Figure 4. Pretreatment occlusal photographs.

Figure 5. Pretreatment hand and wrist radiograph.

Figure 6. Pretreatment panoramic radiograph.

Treatment Progress

A tight fit maxillary movable appliance is fabricated with a vestibule arc and 2 clasps on the upper first permanent molars. The posterior occlusion of the appliance was raised (Figure 7). The patient was told to wear the maxillary appliance all day, except for eating, contact sports and brushing teeth. She used the chincup, which consists of a head-supported headgear and a chinrest placed on the chin, for 12-15 hours per day to prevent the extreme development of the lower jaw. A force of 250 g was applied to each side (Figure 8). The patient was examined and progress of the treatment was observed monthly by an orthodontist.

Figure 7. Maxillary removable appliance.

Figure 8. Chincup.

Results

Pre and post-treatment lateral cephalograms and photographs were taken on the same machine by the same person.

A positive overjet and overbite were obtained after 10 months of the treatment. 1 mm overjet and 2,5 mm overbite were achieved (Figure 9). According to Moyers analysis[14] after treatment; maxillary arch length deviation was 0 mm and Mandibular arch length deviation was 0 mm (Figure 10)

According to the hand and wrist radiographs taken after the treatment, it was observed that the patient was in the S skeletal stage and showed 4,4% skeletal growth during the 10-month treatment period (Figure 11).

Panoramic radiograph taken after the treatment showed that the patient was still in the mixed dentition period and the permanent canines tended to erupt (Figure 12).

According to the post-treatment cephalometric radiograph[12], there was a positive increase of 1,5 degrees in SNA and ANB increased to 1,5 degrees. The SNB had not changed. The patient's Class I skeletal structure (ANB= 1.5˚) and normodivergent growth pattern (GoGn/SN= 30˚) was preserved. According to Steiner soft tissue analysis[13], the upper lip protruded 1,5 mm (Table 1), and accordingly, a positive change was observed in the patient's profile with growth and development (Figure 13).

In the total superimposition of the pre and post-treatment lateral cephalogram made according to the criterias of Björk[15]; forward and downward growth in the nasion, maxilla and mandible. The negative overjet became a positive overjet. Following these, positive changes also were observed in soft tissue. In the local maxillar superimposition of the pre and post-treatment lateral cephalogram made according to the criterias of the Björk[15]; along with parallel descent of the maxilla, sagittal and vertical dentoalveolar development was observed in the molars and incisors. In the local mandibular superimposition; a slight anterior rotation in the mandible, retrusion and dentoalveolar development in incisors, mesialization and dentoalveolar development in molars were observed (Figure 14). This female patient in the prepubertal period will continue to use chincup for control purposes until her growth and development is over.

Figure 9. Post-treatment intraoral photographs, overjet and overbite photographs.

Figure 10. Post-treatment occlusal photographs.

Figure 11. Post-treatment hand and wrist radiograph.

Figure 12. Post-treatment panoramic radiograph.

Figure 13. (a) Post-treatment photographs (b) Frontal view (c) Lateral view

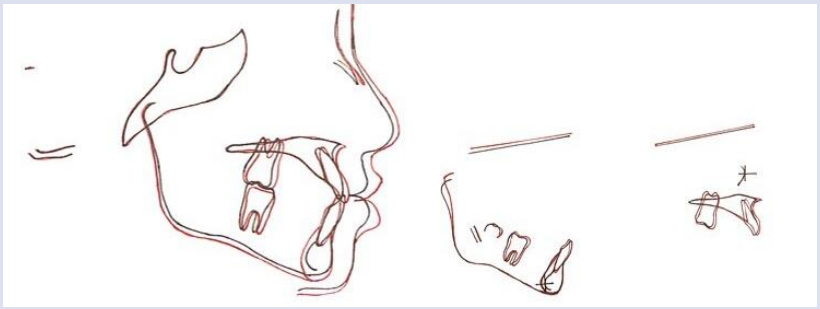

Figure 14. Pre- and post-treatment tracings superimposed

Table 1. Pre- and post-treatment cephalometric analysis.

	Pretreatment	Post-treatment
SNA (degrees)	76.5˚	78˚
SNB (degrees)	76.5˚	76.5˚
ANB (degrees)	0˚	1.5˚
SND (degrees)	75˚	75˚
1-NA (length/degrees)	3 mm / 22˚	3 mm/ 25˚
1-NB (length/degrees)	4.5 mm / 27.5˚	2.5 mm/ 22.5˚
Pg-NB (length)	0.5 mm	0.5 mm
Holdaway difference (length)	4 mm	2 mm
Interincisal angle (degrees)	130.5˚	131˚
Occ/SN (degrees)	18.5˚	18.5˚
GoGn/SN (degrees)	30˚	30˚
Steiner Soft Tissue Analysis (length)	UL = -1 mm LL = 2.5 mm	UL = 1.5 mm LL = 4.5 mm
IMPA (degrees)	95˚	90.5˚

Discussion

Short-term use of orthopedic appliances is an effective treatment choice in children with Class III malocclusion and growing children.[16] Bionator[17], Frankel (FR-III)[18], chin cup[19], protraction face mask, double-plate appliance[20], Eschler progenic appliance[21] are used for treatment of Class III. In the treatment of functional Class III or skeletal Class III malocclusions, the suitability of these appliances is decided following the examination of the patient's clinical and skeletal measurement values. Treatment of pseudo or functional Class III malocclusion should be initiated as soon as possible before the patient's growth development is over. In the early treatment Class III malocclusion, chincup can be used by the patient to stop the unwanted overgrowth of the mandible.[22]

In this case, pseudo class III accompanying anterior crossbite diagnosed in the prepubertal period were treated with a maxillary appliance and chincup. The posterior of the maxillary appliance is elevated. Thus, it was aimed to free the maxilla from the confinement of the mandible and to ensure that the maxilla grows comfortably with normal growth and development without pressure from the mandible. The purpose of the chincup application for 12-15 hours is to inhibit the unwanted forward growth of the mandible.

At the end of the treatment, the negative overjet turned into a positive overjet. The following positive changes were observed in the soft tissue. With the use of the posteriorly raised maxillary removable appliance, anterior crossbite was eliminated and the maxilla was freed and it could easily continue its own growth development.

Posterior rotation of the mandible is usually observed as a result of treatment with the chincup.[23] However, in this case, contrary to expectations, there was a slight anterior rotation of the mandible. The use of a posteriorly raised maxillary appliance had a posterior bite block effect and with a positive overjet the condyle found its proper place. The condyle was enlarged, the growth angle of the condyle neck changed with the effect of the chincup and a slight anterior rotation of the mandible happened. Mesialization was observed in mandibular molars with the use of leeway space reserve[24], and retrusion was observed in mandibular incisors with the effect of chincup.

Conclusions

At the end of the treatmentof thie case, Class I dental relationship and smooth soft tissue profile were obtained by using chincup. Raising the posterior bite while using chincup is an effective recommended method while treating pseudo Class III malocclusions in the early growth period patients and is also seen in the treatment outcome of this case.

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