

Face Mask Protocol in An Individual with Skeletal Class III in Malocclusion: A Case Report

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Abstract

In this case presentation, it was aimed to treat a male patient aged 12 years and 1 month with Skeletal Class III anomaly characterized by maxillary retrognathia and achieve Skeletal Class I bite without the need for future orthognathic surgical procedures. In order to easily bypass the anterior crossbite of the patient, an intraoral clear plate to increase the occlusion was used. In order to rectify the maxillary retrognathia, a petit-type face mask was used for 8 weeks. With the application of the face mask, a successful treatment was achieved. Significant corrections were achieved in the skeletal, dental and soft tissue values of the patient.

Keywords: Face Mask, Maxillary Retrognathia, Skeletal Class III Malocclusion

Introduction

In the treatment of anomalies in orthodontics, one of the orthodontic, orthopedic or orthognathic surgery treatment options or their combination can be implemented by looking at individuals' present stage of pubertal growth spurt.

The treatment of individuals with Skeletal Class III malocclusion is among the most difficult types of orthodontic treatment [1-4]. In certain individuals with Skeletal Class III anomalies, it is argued that maxillary retrusion and mandibular prognathism have the same frequency [4-6]. On the other hand, while maxillary retrognathia can be observed in individuals with Skeletal Class III malocclusion, maxillary retrognathia and mandibular prognathism can also be observed [4]. The frequency of Skeletal Class III malocclusion is 1-5% in white individuals, 5% in Latinos and 9-19% in Asians [7, 8]. This rate is 3-5% in Caucasians and 3-6% in Africans and Americans while it ranges from 3 to 7% in Colombians [9, 10]. Individuals with Skeletal Class III malocclusion possess a vertical overgrowth pattern and this situation is among the leading problems encountered by orthodontists in clinical applications [11, 12].

In the study conducted by Wolfe et al., a Skeletal Class I control group was compared with patients with Skeletal Class III malocclusion, and it was reported that the patients with Skeletal Class III malocclusion possessed a hyperdivergent facial appearance with increased lower face height [13].

Although changes could be achieved in certain patient groups up to ages 11-12 for the correction of the maxillary position, it was stated that making interventions before age 8 was suitable to achieve visible improvement [14, 15].

Declare stated that in order to correct maxillary retrusion, the maxilla can be pulled forward by applying extraoral forces to individuals at early ages [16]. The researcher suggests that it is more suitable to perform orthodontic interventions in periods when growth and development activity continue in order for functional orthopedic treatments to succeed.

In this case report, a petit-type face mask was applied to a 12-year-old male patient with maxillary retrognathia without palatal bone support, and the transition of the patient from a state of negative overjet to positive overjet as well as the consequent change in their morphometric values during the 8-week treatment process were examined.

Diagnosis and Etiology

The 12-year-old male patient applied to our clinic with the complaint of prognathism. In the anamnesis taken from the patient, it was noted that they did not have any systemic disorders.

In the clinical examination of the patient, it was observed that the lower chin was prognathic, and that the lower teeth extended outward farther and folded backwards compared to the upper teeth, as stated by the patient. The nasal airway was open, and it was observed that the patient performed both oral and nasal breathing. Tongue posture and size was found to be normal. Oral habit was present in the patient while onychophagia was detected. Basic tongue thrust was observed in the patient while speaking and swallowing. No pain and joint sound were observed in the temporomandibular joint (TMJ). In the frontal assessment of the patient, a symmetrical facial structure was present, the lips were shut while resting and the patient was found to have

a flat facial appearance in the profile examination. The patient has an inadequate smile line. The most important finding is that negative overjet is present in the De Nevreze maneuver and the patient is unable to align their incisor teeth (Figure 1).

Deep bite was present in the patient, and the overbite value was 8.07 mm while the negative overjet distance was 2.21 mm. The permanent maxillary canines have not completed their eruption (Figure 1 / Figure 2).

Before initiating the treatment of the patient, model scanning was performed using the 3shape program (Figure 2), and cephalometric figures, wrist figure, anteroposterior figures and orthopantomographic figures were taken for radiographic examinations

(Figure 3). In the wrist figure assessment, it was determined that the pubertal growth spurt had not yet begun prior to the treatment (Figure 3)

Using the Dolphin program, drawings and measurements were performed on the cephalometric figure obtained from the patient (Figure 3). According to the data obtained, maxillary retrognathia (SNA: 72.9°) was identified in the patient. It was observed that Skeletal Class III (ANB: -2.2° - Wits: -7.1 mm) malocclusion was present. The vertical measurements of the patient (FMA: 22.3° , SN-GoGN: 31.4°) were within normal levels, and low values were determined in both the upper and lower incisor axes (I-SN: 90.1° - IMPA: 84.6°).



Figure 1: Pretreatment Extraoral and Intraoral Figures

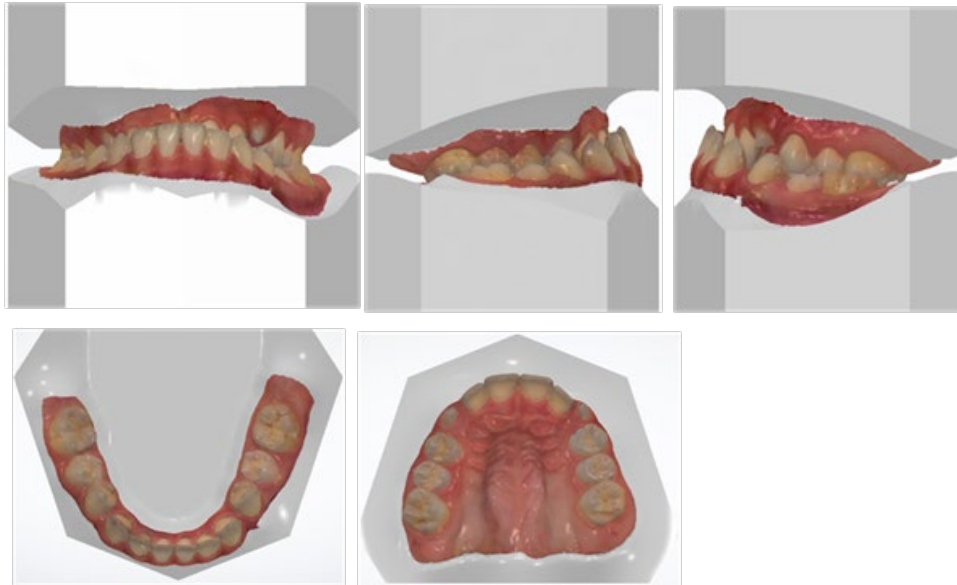


Figure 2: Pretreatment Intraoral Model Views

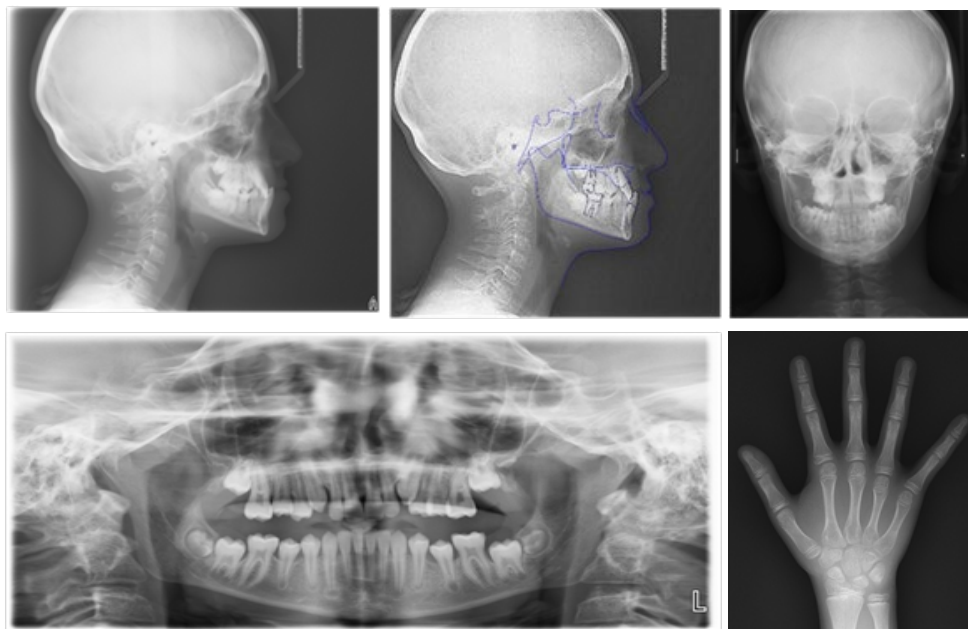


Figure 3: Pretreatment Radiographic Figures

Treatment Objectives

During the correction of the maxillary retrognathia present in the patient, it was decided to perform overtreatment for the growth and development of the patient. Additionally, it was aimed to achieve a more aesthetical appearance with the correction of the patient's smile aesthetic, upper-lower incisor axes and the positions of the teeth.

Treatment Progress

As a result of the analyses and measurements performed, it was decided to apply a face mask to the patient. For the apparatus to be applied to the patient, orthodontic bands were applied to the maxillary first molar and first premolar teeth and no orthodontic bone anchor was required. This is because it was aimed to increase the low axial slopes of the upper incisors.

A petit-type face mask was applied and, in order to eliminate the obstacle of overbite and crossbite, and a 2 mm-thick clear plate with an occlusal riser was made and applied. The patient was instructed to wear this clear plate for as long as they use the face mask.

Elastics were used as the effective force between the petit-type face mask used on the patient and the intraoral apparatus. An initial force of 450 gr was generated in the rubber on each side and these forces were set at 500 grams for each side depending on the course of the treatment, and a total force of 1 kg was applied.

The petit-type face mask was applied to the patient for a total of 8 weeks. The patient responded very well to the treatment and no complications were observed throughout the treatment process (Figure 4).



Figure 4: Extraoral and Intraoral Figures Following Petit-Type Face Mask Use

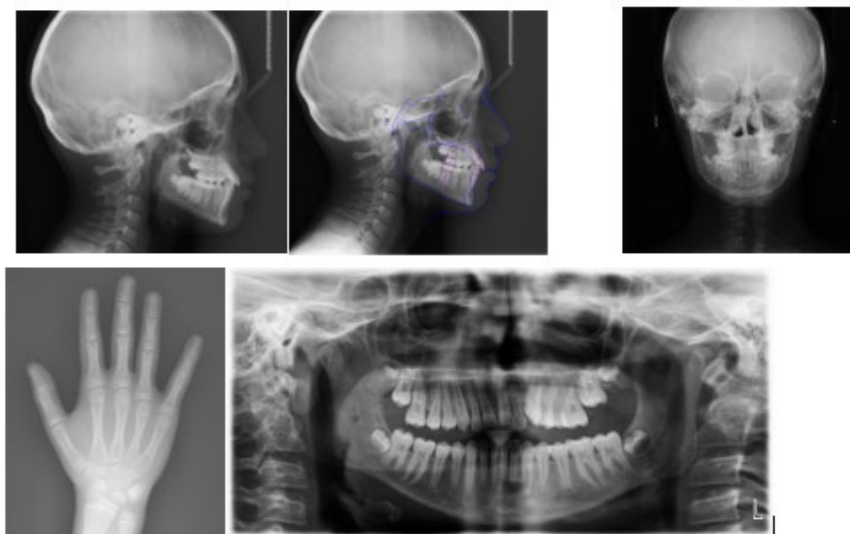


Figure 5: Radiographic Figures Following Petit-Type Face Mask Use

Results

Conclusion

Following 8 weeks of face mask use, the patient reached a positive overjet value (Table 1). After the face mask treatment, the patient was subjected to a 3-month passive reinforcement period. Figure 4 and 5 show the changes on the patient following the reinforcement period. The patient asked to end the treatment early as they were going to move abroad and, although a good overjet overbite relationship was established, the patient's molar teeth in the left posterior region remained in a crosswise position.

Table 2 shows the pre-treatment, post-treatment and post-passive reinforcement cephalometric values of the patient. The

Skeletal Class III malocclusion present in the patient changed to a Skeletal Class I Malocclusion while, dentally, it changed from Class III occlusion to Class II subdivision (Figure 6).

The patient's radiographic images and extra-intraoral photographs after the face mask protocol applied are shown in figures 7 and 8. (Figures 7-8)

It is predicted that the patient's jaw direction of growth gravitated from the horizontal direction to the vertical as a result of both the petit-type face mask and growth. This is observed in cephalometric measurements (Table 2).

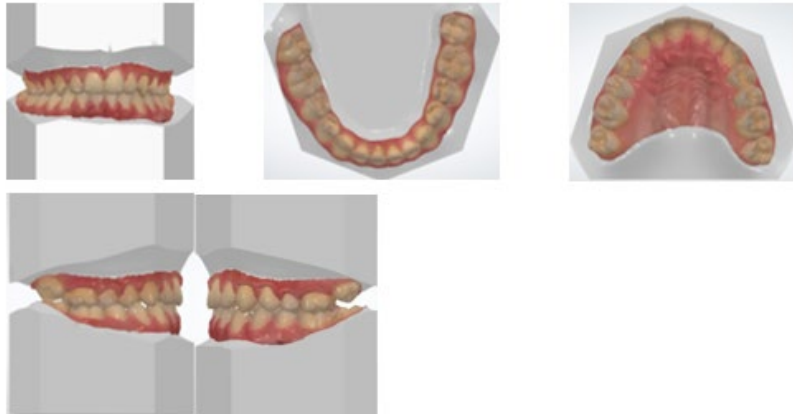


Figure 6: Post treatment Intraoral Model Views

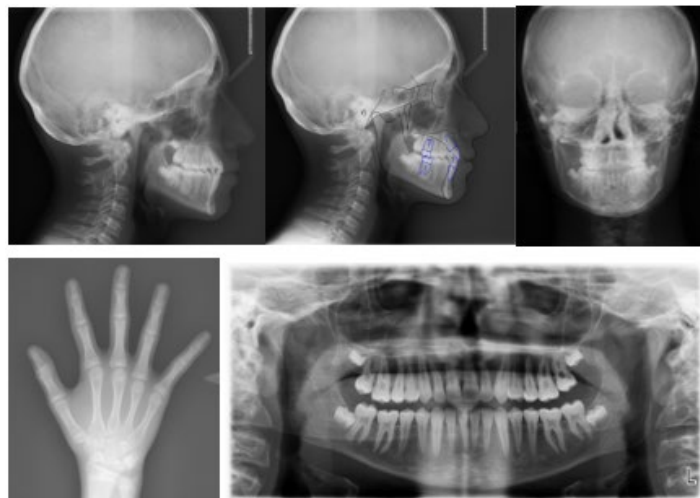


Figure 7: Post treatment Radiographic Figures



Figure 8: Post Treatment Extra Oral and Intraoral Figures

Table 1: Overjet Overbite Relationship

	PRETREATMENT	POSTTREATMENT
OVERJET	-2.21	2.31
OVERBITE	8.07	1.7

Table 2: Cephalometric Analysis Results

MORPHOMETRIC MEASUREMENTS	NORM VALUES	PRETREATMENT	TREATMENT	POSTTREATMENT
SNA(°)	82±3.5	72.9	75.2	74.4
SNB(°)	80.9±3.4	75.2	74.4	73.4
ANB(°)	1.6±1.5	-2.2	0.8	1
Wits Appraisal (mm)	-1.0± 1.0	-7.1	0.7	-0.9
FMA(MP-FH) (°)	24.9±4.5	22.3	25.4	25
SN-GoGN(°)	32.9±5.2	31.4	32.7	33.1
Y-Axis (SGn-SN) (°)	67 ±5.5	68	70	72
Saddle/Sella Angle (SN-Ar) (°)	124±5	125.3	131.4	135
Articular Angle(°)	142.5±6	147.1	136.4	136.6
Gonial/Jaw Angle (Ar-Go-Me) (°)	125±6.7	120.6	127.4	125.7
Mandibular Body Length (Go-Gn)(mm)	70.5±4.4	68.1	68	72.1
Ramus Height (Ar-Go) (mm)	44±4.5	40.3	44.6	47.7
I-SN(°)	102.5±5.5	90.1	106.9	102.5
IMPA (L1-MP)(°)	95±7	84.6	82.6	83.6
Interincisal Angle (U1-L1)(°)	130±6	151.4	134.4	135.9
Upper Lip to E-Plane (mm)	-4±2	-6	-3.4	-4.6
Lower Lip to E-Plane (mm)	-2±2	-0.5	0.6	-0.2
Nasolabial Angle (Col-Sn-UL) (°)	102±8	102.4	104.7	109.2

Discussion

In treatments to be applied to patients who are growing up, identifying the pubertal growth spurt and determining its application can be a challenging decision for clinicians. In treatments aiming skeletal transformation, treating the patient in early mixed dentition is more suitable [14, 17]. In the case treated in the present report, the patient had completed mixed dentition and newly transitioned into permanent dentition. In the study conducted by Lee et al., it was reported that mini plate application produced more efficient results for the effectiveness of the face mask while Castrillón-Marín et al., stated that skeletal anchorage provided higher rectification compared to dental anchorage [18, 19]. In the present case, it was decided that maxillary dental support was sufficient for anchorage due to the characteristic of the case.

While previous face mask studies stated that a force of 300-500 grams on one side could be sufficient for the maxillary protraction process, Cevidanes et al., reported that applying 250 grams of force on one side could be sufficient and that better recovery could be achieved this way [20, 21]. In the present study, forces up to 500 grams were applied separately on both the right and left side, and a total force of 1000 grams was applied to the patient. With the force applied, the patient transformed from a state of negative overjet to positive overjet within a short period of time.

Again, in the literature, it was stated that it is necessary to begin treatment until the ages 11-12 in order to achieve rectification in cases with maxillary retrusion, and that it is more appropriate to intervene before the age 8 for an apparent correction [14, 15]. In the present study, a face mask was applied to a male patient aged 12 and positive results were achieved in 8 weeks.

When the post-treatment findings were examined, it was determined that there were increases in mandibular ramus and corpus length depending on the growth spurt, although the increase in mandibular corpus growth was lower and the increase in ramus length was higher in relation to face mask use.

The present study showed that treatment could be performed within a very short period of time and positive results could be achieved with the right timing, right treatment choices and patient compatibility. The present study can serve as a research subject by increasing the number of patients suitable for similar cases. It is important to elaborate the application by forming prospective groups.

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