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Treatment of pseudo-class III malocclusions with the han appliance (2 Cases)

Pseudo-Class III Maloklüzyonların Tedavisinde Han Apareyi (2 Olgu Nedeniyle)

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Özet: *Kesici dişlerin rehberliği ile alt çenenin öne doğru yer değiştirmesi fonksiyonel veya pseudo-Class III malokluzyonu meydana getirmektedir. Erken dönem tedavi ile, bu durumun gerçek Class III malokluzyon olması engellenmekte ve normal kesici ilişkinin sağlanması ile tercih edilen büyüme ve okluzal ilişki meydana gelmektedir.*

Bu vaka raporunda pseudo-Class III malokluzyonun karışık dişlenme dönemindeki tedavisinde kullanılan Han apareyinin iskelet ve dentoalveolar yapıya etkileri değerlendirilmiştir.

Yaşları 9 yıl 1 ay ile 11 yıl 9 ay olan 2 kız bireyde, 4 ay 10 gün ve 7 ay 12 gün süreyle Han apareyi kullanılmıştır. Tedavi öncesi ve pseudo-Class III malokluzyonun düzelmesini takiben tedavi sonrası elde edilen lateral sefalometrik filmler üzerinde iskelet ve dentoalveolar yapıda meydana gelen gelişimler değerlendirilmiştir.

Tedavi sonunda, SNA açısının artış ve SNB açısında azalma, ön yüz yüksekliğinde ve alt ön yüz yüksekliğinde artış, overjetin miktarında artış ve overbite miktarında azalma görülmüştür.

Pseudo-Class III malokluzyonun Han apareyi ile tedavisinde alt çene büyümesinin engellenmesi, alt ön yüz yüksekliği artışı ve üst çene büyümesinin devam etmesi sonucu ANB açısında düzelme meydana gelmiştir. Overjet miktarındaki artışta iskeletsel katkı yanında, daha büyük oranda üst kesici dişlerin protrüzyonu ve alt kesici dişlerin retrüzyonu etkili olmuştur.

Anahtar kelimeler: *Pseudo Class III malokluzyon, Erken tedavi, Han apareyi.*

Summary: *A posturing forward of the mandible to clear anterior incisal interference brings forth a Pseudo Class III malocclusion. Early treatment of this type of problem prevents the development of a true Class III malocclusion. The establishment of normal incisor guidance induces a favorable occlusal relationship and sound growth of both jaws. In this case report the skeletal and dentoalveolar effects of the Han appliance on Pseudo Class III patients in the mixed dentition period were evaluated.*

2 female cases aged 9 years 1month and 11 years 9 month composed this case report. The Han appliance was worn for 4 months 10 days and 7 months 12 days. Skeletal and dentoalveolar changes were evaluated from pre- and post-treatment cephalograms.

At the completion of treatment the following were observed: SNA angle increase and SNB angle decrease, anterior face height and lower anterior face height increase, overjet increase and overbite decrease.

Treatment of Pseudo Class III malocclusions with the Han appliance induces an inhibition of mandibular growth along with a continuation of maxillary growth and an increase in the lower anterior face height, thus leading to the correction of the ANB angle. Increase in the overjet is mainly due to a protrusion of the upper incisors and a retrusion of the lower incisors; however, a slight skeletal contribution to this increase may be cited.

Key words: *Pseudo Class III malocclusion, early treatment, Han appliance.*

Inroduction

Angle Class III malocclusions are characterized by having the mandibular dentition positioned more anteriorly relative to the maxillary dentition (1,2). This mesial position of the mandibular dentition may be related to at least two different factors.

One form of Class III malocclusions may be the outcome of an increased anterior mandibular growth, decreased anterior maxillary growth, or a combination of both situations. In other words, the problem is skeletal (1,3).

Another form of Class III relationships may result from mandibular position. The mandible shifts forward to escape incisor interferences–giving rise to a Pseudo Class III malocclusion (1,3).

In Pseudo Class III malocclusions the skeletal relationship is usually Class 1 or mildly Class 3. Dentoalveolar evaluation frequently demonstrates retroinclination of upper and proclination of lower anterior teeth (3,4,5).

During the early mixed dentition period the prognosis of Pseudo Class III malocclusions is stated to be good (6). Holding the mandible in a posterior position and

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guiding the maxillary incisors into a correct relationship provide the opportunity for normal dental base development along with favorable skeletal growth during early treatment (5,6,7).

A literature survey manifests the following appliances for the treatment of Pseudo Class III malocclusions; removable mandibular retractor (8), Fränkel III (9,10,11), Bionator III (12), mandibular headgear (13), and 2x4 fixed appliances in the upper and lower jaws (5).

In 1995 Terrance J. Spahl introduced the Han appliance, originally developed by Dr. Bo Kuoon Han (14). The Han appliance is a dual-arch active plate, united by an interocclusal acrylic. The lower plate includes a labial bow with "U" bends. The upper plate contains two expansion screws. The activation of these screws moves the middle and anterior third of the upper plate forward. Furthermore, a small wire clip wrapping around the distal edge of the permanent lateral incisors should be placed, thereby keeping the four permanent upper incisors together. The activation of the screws is made 1/4 mm twice a week (14) (Figure 1).

The correct position of the mandible is very important during the taking of the construction bite. The vertical thickness of the interocclusal acrylic has to be adequate to permit the forward jumping of the upper incisors. In the sagittal plane the mandible must be positioned in the most retruded position (14).

In this case report the skeletal and dentoalveolar effects of the Han appliance on Pseudo Class III patients in the mixed dentition period were evaluated.

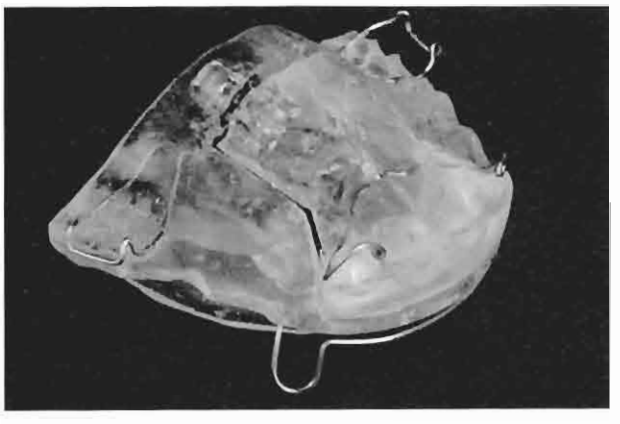


Figure 1: Han appliance

Subjects and Method

In this case report, the treatment of 2 female patients was carried out with the Han appliance. Skeletal and dentoalveolar changes were evaluated from pre- and post-treatment lateral cephalograms, which were superimposed on the cranial base. For this evaluation the angular and linear measurements given in Figure 2 were used. Skeletal and dentoalveolar changes in the sagittal plane were measured relative to VertS line, a perpendicular to the SN line at S point.

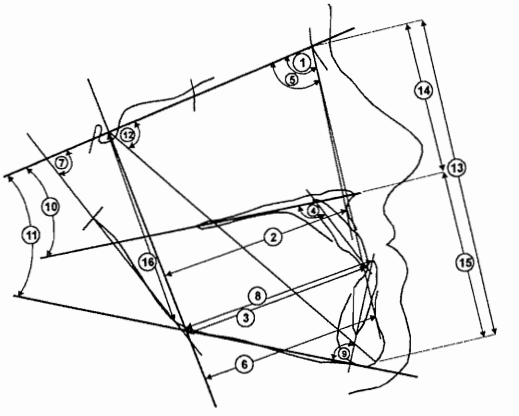


Figure 2: *Parameters used to evaluate skeletal and dentoalveoar changes: 1.SNA, 2.VertS-A, 3.VertS-U1, 4.ANSPNS/U1, 5.SNB, 6.VertS-B*
7.SN/ArGo, 8. VertS-L1, 9.MandL7L1, 10. SN/ANSPNS, 11.SN/GoGn, 12.SN/SGn, 13.N-Gn, 14.N-ANS, 15.ANS-Gn, 16.S-Go.

Case 1 (E.Y.)

Intraoral examination of this female patient, aged 9 years 1 month, demonstrated a bilateral Class III molar relationship, an anterior and a mild posterior crossbite. Overjet and overbite values were –2.0 mm and 4.0 mm, respectively. Functional examination showed a posteriorly moving mandible until an edge-to-edge incisor relationship. A skeletal Class 3 (ANB= -1.5^0) and an optimal mandibular plane angle (SN/GoGn= 30.0^0); normal lower (MandL/L1) and upper incisor (ANSPNS/U1) inclinations were found (Table I, Figure 3).

At the completion of treatment (4 months 10 days) a Class I molar relationship and correction of the anterior crossbite were observed (Figure 3). Anterior movement of A point (VertS-A), increase of the SNA angle, posterior movement of the chin (VertS-B) and a decrease of the SNB angle were measured. Increase of

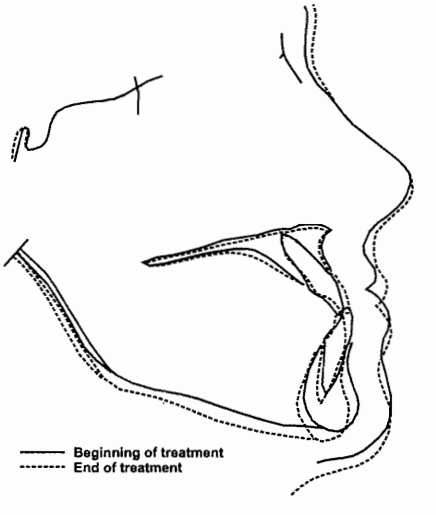


Figure 4: *Skeletal and dentoalveolar changes of Case 1.*

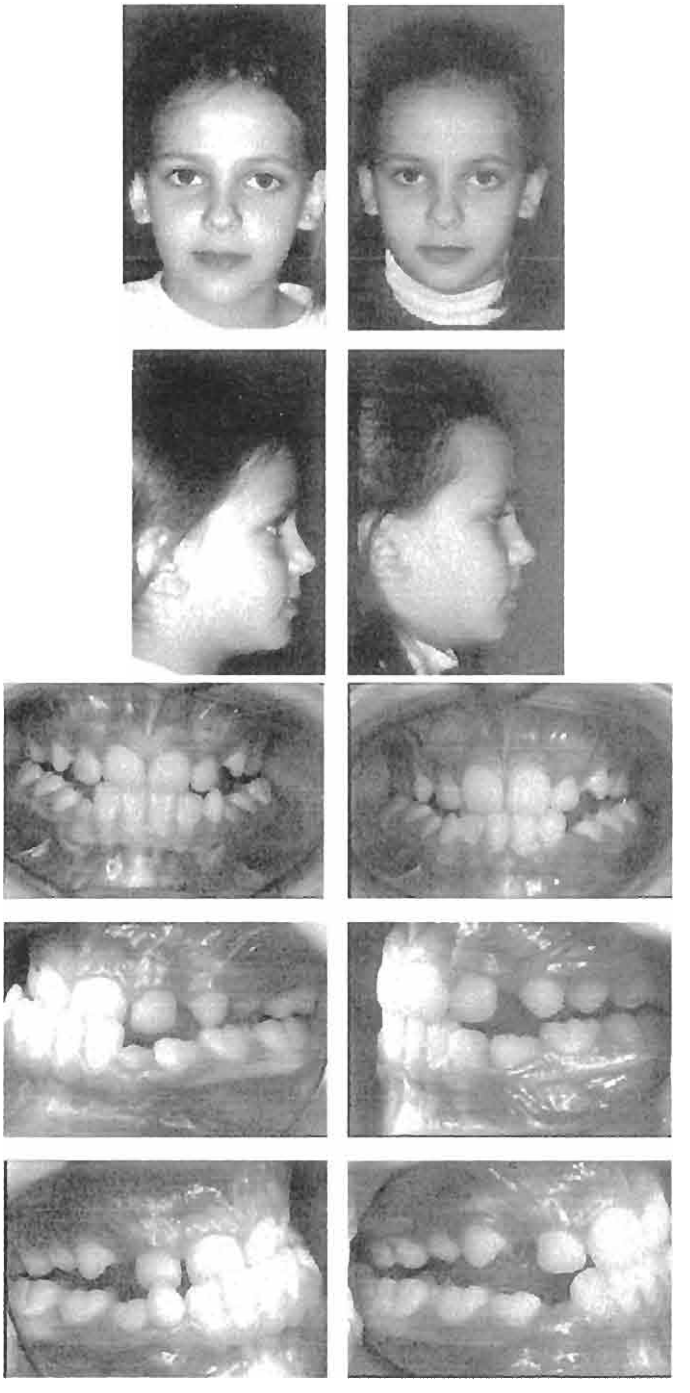


Figure 3: *Pre-and post-treatment extra-and intra-oral photographs of Case 1.*

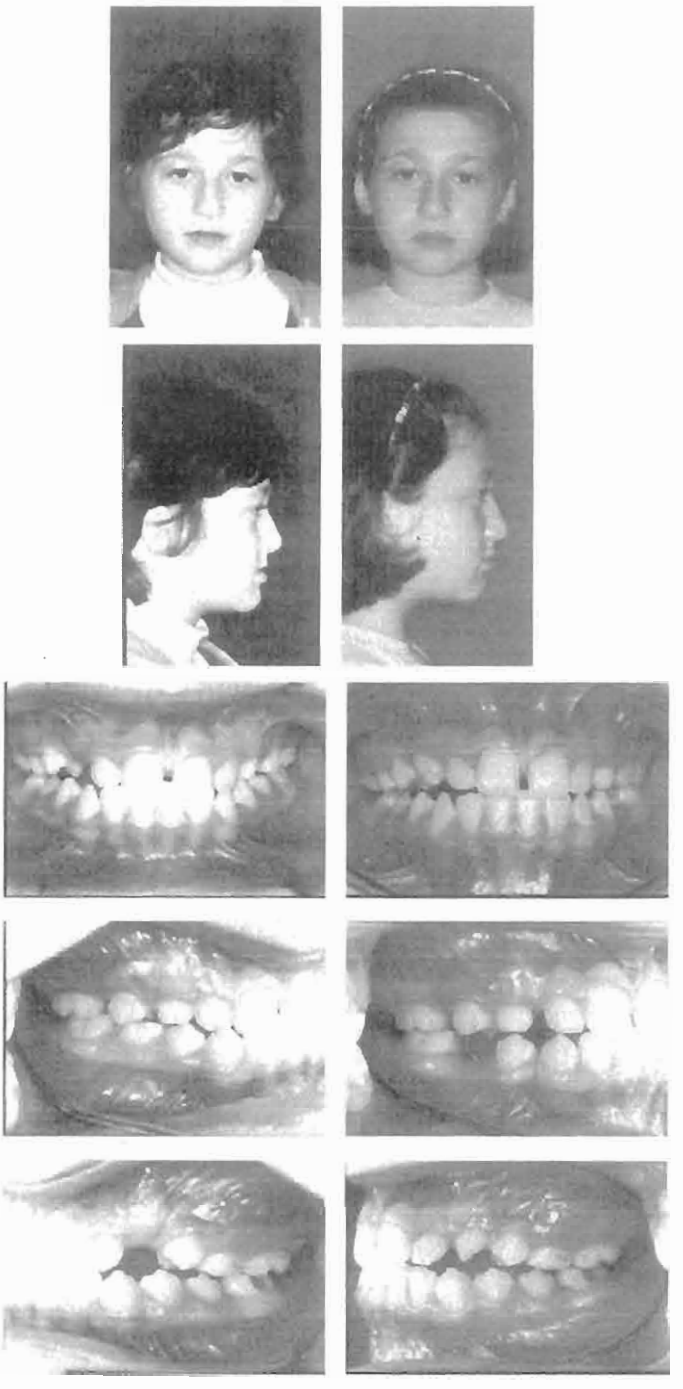


Figure 5: Pre-and post-treatment extra-and intr-oral photographs of case 2.

		CASE1			CASE2		
		Beginning of treatment	End of treatment	Difference	Beginning of treatment	End of treatment	Difference
Maxillary skeletal and dentoalveolar parameters	SNA	82.0	83.0	1.0	73.0	75.0	2.0
	VertS-A	66.5	67.0	0.5	50.0	52.0	2.0
	VertS-U1	69.0	71.0	2.0	48.5	53.5	5.0
	ANSPNS/U1	113.0	118.0	5.0	113.0	118.0	5.0
Mandibular skeletal and dentoalveolar parameters	SNB	83.5	82.0	-1.5	77.0	77.0	0.0
	VertS-B	68.0	65.0	-3.0	45.0	45.0	0.0
	SN/ArGo	70.5	72.5	2.5	83.5	85.0	1.5
	VertS-L1	71.5	68.5	-3.0	51.0	51.0	0.0
	MandL/L1	90.5	88.0	-2.5	82.0	81.5	-0.5
Vertical parameters	SN/ANSPNS	8.0	8.0	0.0	12.0	10.0	-2.0
	SN/GoGn	30.0	31.0	1.0	35.5	35.0	-0.5
	SN/SGn	60.0	62.5	2.5	68.5	68.5	0.0
	N-Gn	96.0	98.0	2.0	103.0	104.0	1.0
	N-ANS	46.0	46.0	0.0	48.0	47.0	-1.0
	ANS-Gn	50.0	52.0	2.0	54.5	56.5	2.0
	S-Go	64.0	64.5	0.5	63.0	63.5	0.5
Maxillary-mandibular skeletal and dentoalveolar	ANB	-1.5	1.0	2.5	-4.0	-2.0	2.0
	Overjet	-2.0	2.0	4.0	-3.0	2.0	5.0
	Overbite	4.0	1.0	-3.0	3.5	1.0	-2.5

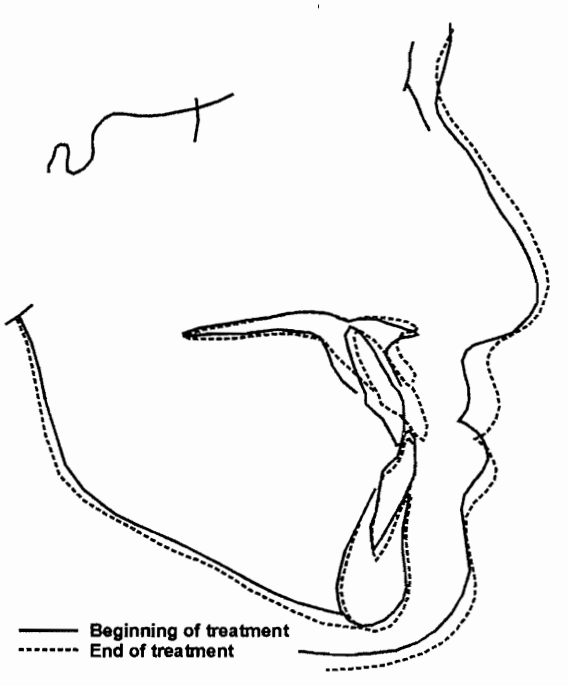
Tablo I: *Skeletal and dentoalveolar changes of Case 1 and 2.*

the ANB angle resulted from changes of SNA and SNB angles. SN/GoGn and SN/SGn angles indicated a posterior rotation of the mandible. Anterior (N-Gn) and lower anterior face heights (Ans-Gn) increased. Upper incisors moved (VertS-U1) and tipped (ANSPNS/U1) anteriorly; lower incisors moved (VertS-L1) and tipped (MandL/L1) posteriorly. The overjet increased by 4.0 mm, while the overbite decreased by 3.0 mm (Figure 3,4).

Case 2 (D.S.)

Intraoral examination of this female patient, aged 11 years 9 months, revealed a bilateral Class I molar relationship due to upper molar mesialization and an anterior crossbite. Overjet and overbite values were –3.0 mm and 3.5 mm, respectively. Functional examination demonstrated a posteriorly moving mandible until an edge-to-edge incisor relationship. A skeletal Class 3 (ANB= -4.0^0) and an optimal mandibular plane angle (SN/GoGn= 35.5^0); retroinclined lower incisors (MandL/L1) and normal upper incisor (ANSPNS/U1) inclinations were found (Table I, Figure 5).

At the end of treatment (7 months 12 days) a Class I molar relationship and correction of the anterior crossbite were observed (Figure 5). Anterior movement of A point (VertS-A), increase of the SNA angle, no change of the chin position (VertS-B) and the SNB angle were seen. An increase of the ANB angle due to a change in the SNA angle was observed. The mandibular plane angle remained constant (SN/GoGn, SN/SGn). Anterior rotation of the maxilla (SN/ANSPNS), increase of anterior (N-Gn) and lower anterior face heights (Ans-Gn) and a decrease of upper anterior face height (N-ANS) were observed. Upper incisors moved (VertS-U1) and tipped (ANSPNS/U1) anteriorly; however, the lower incisor position did not change (VertS-L1, MandL/L1). The overjet increased by 5.0 mm, while the overbite decreased by 2.5 mm (Figure 6).



Figür 6: Skeletal and dentoalveolar changes of Case 2.

Discussion

Anterior movement of the mandible with incisor guidance is termed Pseudo Class III malocclusion (1,3). Holding the mandible in a posterior position and guiding the maxillary incisors into a correct relationship provide the opportunity for a normal dental base development along with favorable skeletal growth (5,6,7).

Removable mandibular retractor (8), Fränkel III (9,10,11), Bionator III (12), mandibular headgear (13), 2x4 fixed appliances in the upper and lower jaws (5), and the Han appliance (14) are being used for the treatment of Pseudo Class III malocclusion.

In this case report the skeletal and dentoalveolar effects of the Han appliance on 2 Pseudo Class III patients in the mixed dentition period were evaluated.

With the Han appliance the anterior cross-bite was corrected within a period of 4 months 10 days and 7 months 18 days. The increase of 4.0 and 5.0 mm in the overjet was effective for the correction of the cross-bite. The ANB angle showed an increase of 2.0 and 2.5 degrees. The anterior movement of A point and the posterior movement of B point were responsible for the increase of the ANB angle.

The anterior movement of the palatal 2/3 anterior portion of the Han appliance may explain the increase of the SNA angle. It has been reported that force is applied to the premaxilla via the activation of the 2 expansion screws incorporated into the Han appliance (14). Ülgen and Fıratlı (11) state that the Fränkel 3 appliance has no effect upon the SNA angle. Whereas, Aytan et. al. (9) report that an increase of the ANB angle resulted from an increase of the SNA angle along with the forward movement of the upper dentition in two cases treated with the Fränkel 3 appliance.

One of the reasons for no change or a decrease of the SNB angle may be that the mandible is held in its most retrusive position during treatment. Posterior rotation of the chin due to these vertical facial height increases may be given as an additional reason for a decrease or no change in the SNB angle. In both cases an increase of anterior and lower anterior facial heights was observed. Slattery (15) reported that the changes in SNB and SN/MdP angles contribute to the decrease of mandibular prognathism. Ülgen and Fıratlı (11) mentioned that the reduction of the SNB angle was due to mandibular posterior rotation.

In the treatment of pseudo Class III malocclusions with the Bionator III anterior movement of point A, increase in the maxillary sagittal growth, posterior rotation of the mandibular plane, increase of anterior facial height, and

a decrease in the mandibular sagittal growth were observed (12). Maxillary growth increase and mandibular growth decrease are mentioned to be responsible for the change of the ANB angle (12).

The changes brought forth in the overjet are due to 2 reasons: Dental and skeletal changes. The protrusion of upper incisors and retrusion of lower incisors contributed to the overjet correction in both cases. Skeletally, anterior movement of the maxilla and posterior rotation of the mandible contributed to the overjet correction. Upper incisor proclination and lower incisor retroinclination were found effective for overjet correction in studies concerned with the treatment of pseudo Class III malocclusions (8,15). In the study carried out by Ülgen and Fıratlı (11) overjet correction was explained with mandibular posterior rotation, decrease of SNB angle, posterior tipping of lower incisors and anterior tipping of upper incisors.

Coclusion

Early treatment of Pseudo Class III malocclusions with the Han appliance, which is holding the mandible in its most retrusive position, induces an inhibition of mandibular growth along with a continuation of maxillary growth and an increase in the lower anterior face height, thus leading to the correction of the ANB angle. Increase in the overjet is mainly due to a protrusion of the upper incisors and a retrusion of the lower incisors; however, a slight skeletal contribution to this increase may be cited.

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