

# NON-EXTRACTION TREATMENT OF A SKELETAL CLASS III MALOCCLUSION

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## ABSTRACT

This case report describes the non surgical, non-extraction therapy of a 13 year old boy with a skeletal Class III malocclusion, a prognathic mandible, and a retrusive maxilla. He was initially classified as needing orthognathic surgery, but he and his parents wanted to avoid that. The Class III malocclusion was corrected with a rapid palatal expander and a maxillary protraction mask followed by non-extraction orthodontic treatment with fixed appliances, combined with short Class III and vertical elastics in the anterior area. The height of the maxillary alveolar process and the vertical face height were slightly increased with treatment. Class I molar and canine relationships were achieved, and the facial profile improved substantially.

## KEY WORDS

**Skeletal Class III, Protraction mask, Rapid palatal expander**

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## INTRODUCTION

Class III malocclusions are usually growth related discrepancies that often become more severe until growth is completed<sup>1</sup>.

Facial changes can influence a patient's self confidence and interpersonal relationships<sup>2,3</sup>. The success of early orthopedic treatment in patients with Class III anomalies depends on facial skeletal development and type of treatment<sup>1</sup>, but in some cases, surgery can be part of the treatment plan<sup>4</sup>. When it is associated with an open-bite tendency and unfavorable growth pattern, correction of a Class III relationship without orthognathic surgery can be challenging.

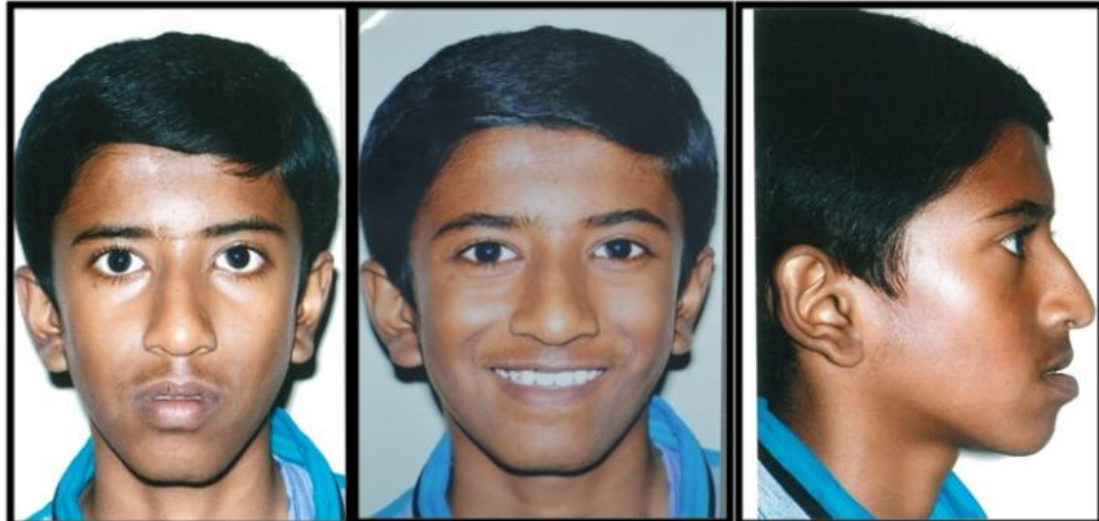
However, a mild vertical growth pattern tendency can be corrected with good treatment protocol and satisfactory patient compliance. Therefore, the purpose of this article was to describe the non surgical treatment of a patient with Class III dental and skeletal relationships.

## DIAGNOSIS AND ETIOLOGY

The patient was a boy, aged 13 years 4 months, whose chief complaint was the anterior crossbite. He had Class III canine and molar relationships on left side and Class I molar relation on right side, 3-mm negative overjet, 4.5-mm overbite, anterior crossbite with the maxillary midline shifted 5.5 mm towards right side. Maxillary dental arch had about 2mm of excess space, and mandibular dental arch had about 4 mm of excess space. There was slight facial asymmetry. Cephalometrically, there were a Class III jaw relationship and a mild tendency of a vertical growth pattern (FMA, SN.Ocl, SN.GoGn). No known relatives in his family had a prominent lower jaw. No symptoms of temporo-mandibular disorder were noted, and he had no pain during jaw movement or on palpation. He was in good health, and his medical history showed no contraindications to orthodontic therapy.

## TREATMENT OBJECTIVES

Treatment objectives included correction of anterior-crossbites, improvement of the



**Extraoral and intraoral photographs before treatment. The profile view shows a slight deficiency in maxillary projection.**

dentoalveolar and maxillomandibular relationships, improvement of facial esthetics, and establishment of a stable occlusion.

The other treatment alternative was a non-extraction orthodontic approach with maxillary expansion.

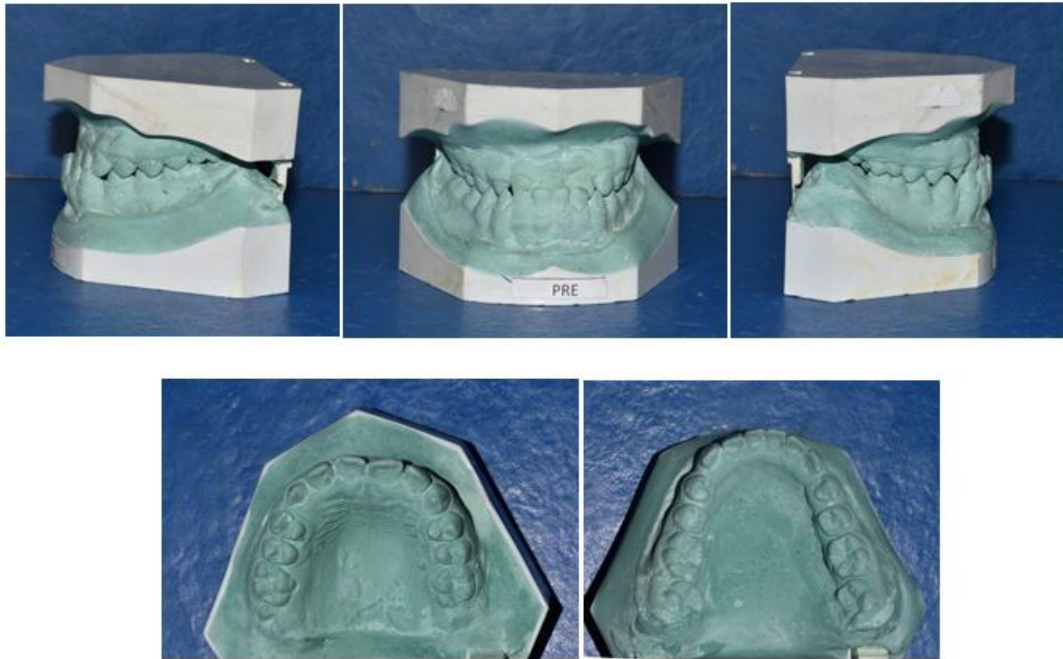
## TREATMENT ALTERNATIVES

Two treatment options were suggested to the patient and his parents.

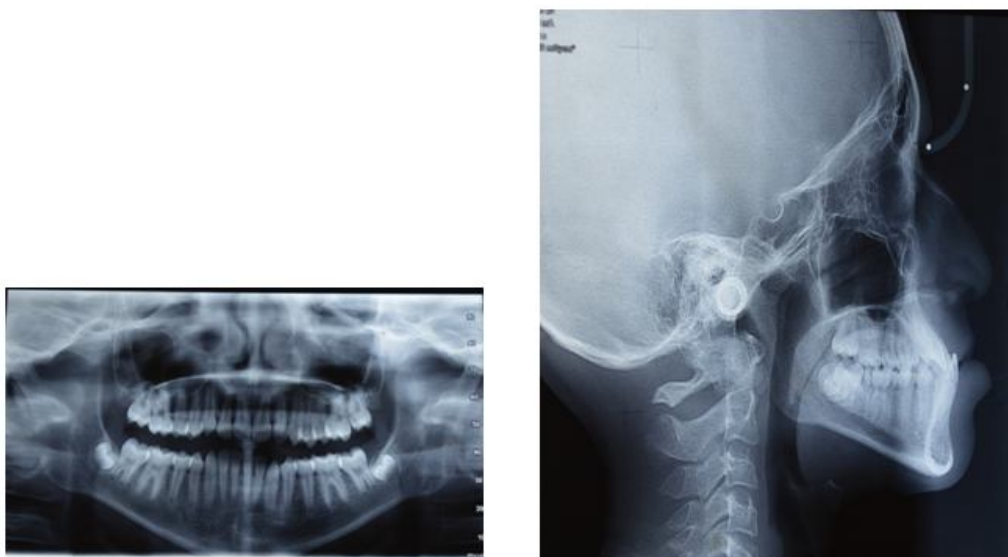
The first consisted of maxillary expansion and of the mandibular first premolars. This would correct the Class III dental relationship, but it would also involve retraction of the mandibular incisors and maxillary protraction with a facemask. The patient and parents did not want orthognathic surgery and tooth extractions. Therefore, they chose this non extraction orthodontic treatment.

## TREATMENT PROGRESS

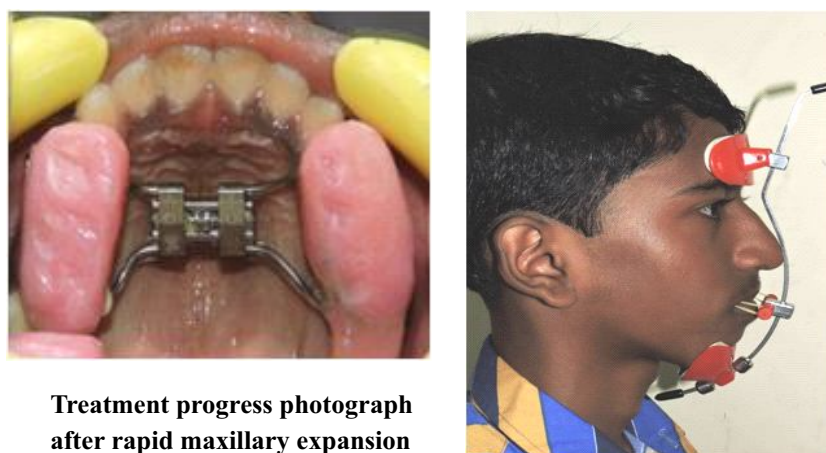
Treatment began with placement of a banded rapid palatal expander on the maxillary first molars and pre-molars. The patient was instructed to activate the appliance 0.5 mm every day for 2 weeks. Subsequently, he received a facemask for maxillary protraction with a forward and downward force directed approximately 30° to 40° to the maxillary occlusal plane. The patient was instructed to wear it for 18 hours a day.



**Initial study models.**



**Pre treatment radiographs.**



**Treatment progress photograph after rapid maxillary expansion**

## CEPHALOMETRIC TREATMENT CHANGES

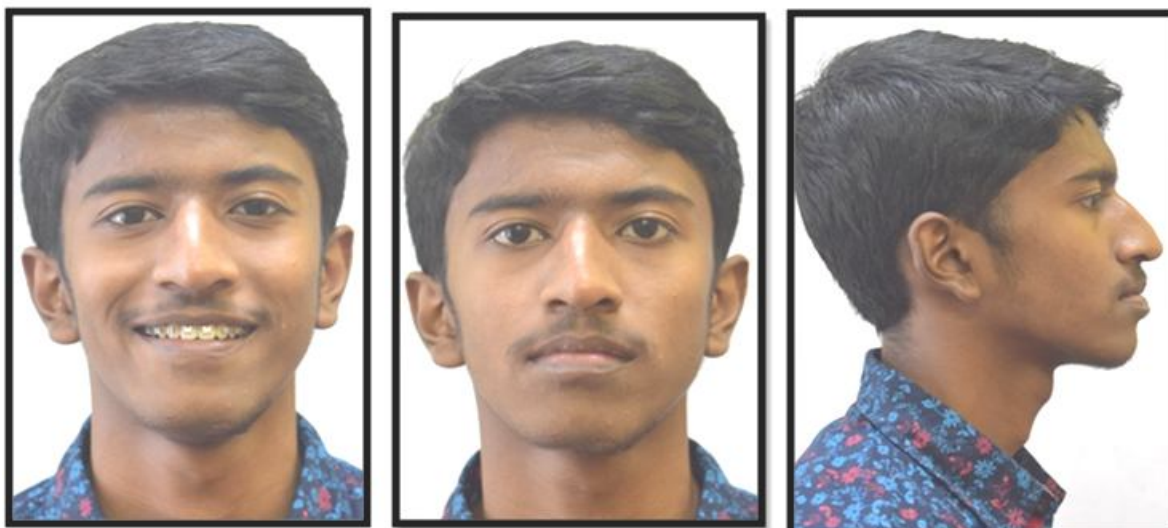
	PRE	POST
<b>MAXILLARY COMPONENT</b>		
SNA(Degree)	75	81
Co-A(mm)	72	76
<b>MANDIBULAR COMPONENT</b>		
SNB(Degree)	79	80
SND(Degree)	75	76
<b>MAXILLOMANDIBULAR RELATIONSHIP</b>		
ANB(Degree)	-4	+1
WITS	-9	-2.5
<b>VERTICAL AND HORIZONTAL COMPONENT</b>		
FMA(Degree)	28	34
SN. OCL(Degree)	23	17
SN.GOGN(Degree)	39	37
LAFH(mm)	56	63
<b>DENTOALVEOLAR COMPONENT</b>		
Mx1 .NA(Degree)	36	31
Mx1 .NA(mm)	11	6
Md1.NB(Degree)	25	18
Md1.NB(mm)	5	4
IMPA(Degree)	85	77
Overjet (mm)	-3	+1.5
Overbite (mm)	-4.5	+2
Nasolabial Angle	91	91

A force of 400 g on each side was delivered by elastics attached to hooks on either side of the intra-oral appliance, between the maxillary canines and premolars. After 9 months, the maxillary expander was removed, use of the facemask was discontinued, and fixed preadjusted appliances(0.022 in slots)were placed on the maxillary and mandibular teeth. Leveling and alignment progressed up to rectangular 0.019\*0.025-inch stainless steel arch wires with continuous use of 3/16-inch Class III elastics. The second molars were not included in the bracketing at this point to prevent molar extrusion during alignment; this could have caused more downward mandibular rotation. After correction of the crossbite and creation of a Class I occlusion, detailing and finishing were undertaken. The total active treatment time was 30 months. Patient compliance was good in using all appliances and elastics during active treatment. For retention he was instructed to wear a chincup for 8 hours every night for 3 years ,because of class iii relapse tendency with growth.<sup>6-8</sup>

## TREATMENT RESULTS

The post-treatment extraoral photographs show general improvement in the facial profile. The post-treatment intraoral photographs and dental casts show satisfactory dental alignment, Class I canine and molar relationships on both sides, and normal overjet, overbite, and transverse relationships. There was significant improvement in the maxillomandibular relationship as cephalometrically shown by changes in the ANB angle, Wits appraisal, and overjet. The maxillary arch moved downward and forward, and the mandible had a slight backward rotation as the SN to occlusal plane angle increased, resulting in a more favorable relationship. The superimposition shows an increase in lower anterior facial height with opening of the mandibular plane angle. The maxillary incisors had labial proclination, and the mandibular incisors were retroclined





**Posttreatment photographs: the intraoral photographs show normal overbite and overjet relationship, elimination of anterior crossbite, and Class I canine and molar relationships.**

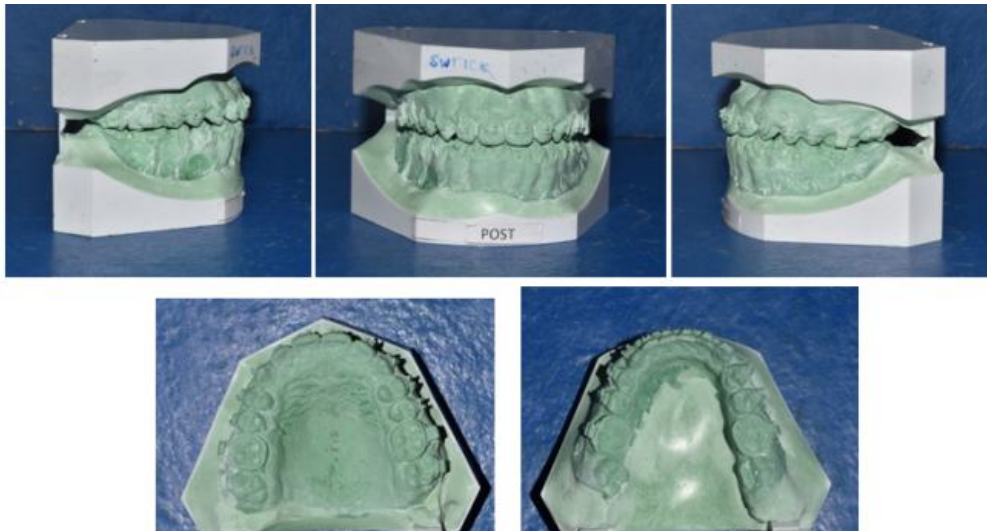
At the end of treatment, a normal morphologic and functional occlusion was obtained, with anterior guidance on lateral excursion and protrusion. Class I molar and canine relationships were obtained on the right and left side, because the patient had excellence cooperation with the Class III elastics.

The good inter dental relationship also provided a well-balanced facial profile, with lip competence. The slight facial asymmetry also showed some improvement as the mild dento-alveolar asymmetry was corrected.

## DISCUSSION

The treatment objectives were attained with the non- extraction treatment protocol. Usually, use of a

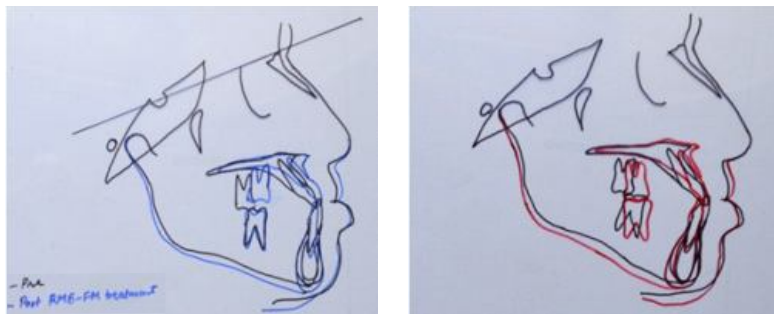
facemask to correct Class III malocclusions through maxillary protraction is indicated in the deciduous and mixed dentitions.<sup>9</sup> Little maxillary protraction is expected when it is used in the permanent dentition.<sup>1</sup> However, there might be some exceptions in compliant patients, when clinically significant maxillary advancement can be obtained, as in this patient. Because there was a 2-mm increase in effective mandibular length and 4 mm increase in maxillary length during the treatment period, However, with maxillary protraction, there was a 4 - mm increase in effective maxillary length, meaning that the procedure actually protracted the maxilla significantly. Probably, the amount of protraction was increased with the previous rapid maxillary expansion,<sup>9</sup> although the effectiveness of this procedure in maxillary protraction has been recently



**Post-treatment study models.**



**Post-treatment cephalometrics**



**Superimposition of initial, final, and retention tracings on SN, centered on S**

questioned. Another factor that contributed to the anteroposterior dentoskeletal improvement was the backward mandibular rotation, shown by increases in FMA, SN : Ocl, SN: GoGn, and lower anterior face height; these are usual side effects of Class III orthodontic mechanics.<sup>13,14</sup>

Obviously, the results reflect the effects of not only the rapid maxillary expansion and protraction with the facemask, but also the Class III elastics. The occlusal and facial results were good, and the patient and his parents were satisfied. The upper lip protrusion consequent to protrusion of the maxillary

incisors improved the facial profile significantly. The decrease in soft-tissue concavity was due in part to redirection of mandibular growth, anterior positioning of the maxilla, and retraction of the mandibular incisors.<sup>14</sup>

If the patient had not been compliant with the facemask and the elastics, another option would have been to extract the mandibular first premolars.<sup>15,16</sup> However, this was not a favorable treatment alternative for the desired soft-tissue changes because the anterior crossbite would be corrected by retraction of the mandibular incisors with little or no

protrusion of the maxillary incisors; this would have produced less improvement in the facial profile than the non-extraction alternative.

In Class III malocclusion treatment, it is usually advisable to obtain overcorrection of the anteroposterior discrepancy.<sup>6</sup> It was stated that anteroposterior inter maxillary elastics produce significant vertical adverse effects<sup>5,13,14</sup>. This can be true if their use is not properly monitored. Use of the correct resistant torques in the maxillary and mandibular incisors to counteract the Class III elastic forces on these teeth is essential. Nevertheless, despite the resistant torques on the maxillary and mandibular incisors, they were substantially tipped, probably because of the large negative overjet that had to be corrected; it required intensive Class III elastic use.

Class III elastics are believed to cause counter-clockwise rotation of the occlusal plane and produce inversion of the natural esthetic smile line.<sup>14</sup> This did not occur in this patient, possibly because of the slight vertical growth pattern. The use of Class III elastics also can cause backward and downward mandibular rotation.<sup>13,14</sup> Backward mandibular rotation is favorable to correct a Class III malocclusion, because it makes the mandible appear less prognathic and contributes to improvement in the facial profile.<sup>18</sup>

## CONCLUSIONS

Successful occlusal and esthetic correction of a Class III malocclusion in the permanent dentition can be accomplished with a protraction facemask and Class III inter maxillary elastics when the patient's compliance in using the elastics is satisfactory. Once the correction is successful, active retention and follow-up are essential if the patient is still growing.

## REFERENCES

1. Franchi L, Baccetti T, McNamara JA. Postpubertal assessment of treatment timing for maxillary expansion and protraction therapy followed by fixed appliances. *Am J Orthod Dentofacial Orthop* 2004;126:555-68.
2. Heldt L, Haffke EA, Davis LF. The psychological and social aspects of orthognathic treatment. *Am J Orthod* 1982;82: 318-28.
3. Kondo E, Aoba TJ. Nonsurgical and nonextraction treatment of skeletal Class III open bite: its long-term stability. *Am J Orthod Dentofacial Orthop* 2000;117:267-87.
4. Kuroda S, Sugawara Y, Yamashita K, Mano T, Takano- Yamamoto T. Skeletal Class III oligodontia patient treated with titanium screw anchorage and orthognathic surgery. *Am J Orthod Dentofacial Orthop* 2005;127:730-8.
5. Miyajima K, Iizuka T. Treatment mechanics in Class III open bite malocclusion with tip edge technique. *Am J Orthod Dentofacial Orthop* 1996;110:1-7.
6. Ferro A, Nucci LP, Ferro F, Gallo C. Long-term stability of skeletal Class III patients treated with splints, Class III elastics, and chin cup. *Am J Orthod Dentofacial Orthop* 2003;123:423-34.
7. Mitani H. Early application of chin cap therapy to skeletal Class III malocclusion. *Am J Orthod Dentofacial Orthop* 2002;121: 584-5.
8. Sugawara J, Asano T, Endo N, Mitani H. Long-term effects of chin cap therapy on skeletal profile in mandibular prognathism. *Am J Orthod Dentofacial Orthop* 1990;98:127-33.
9. Baccetti T, McGill JS, Franchi L, McNamara JA Jr, Tollaro I. Skeletal effects of early treatment of Class III malocclusion with maxillary expansion and face-mask therapy. *Am J Orthod Dentofacial Orthop* 1998;113:333-43.
10. Foley TF, Mamandras AH. Facial growth in females 14 to 20 years of age. *Am J Orthod Dentofacial Orthop* 1992;101:248-54.
11. Love RJ, Murray JM, Mamandras AH. Facial growth in males 16 to 20 years of age. *Am J Orthod Dentofacial Orthop* 1990;97: 200-6.
12. Vaughn GA, Mason B, Moon HB, Turley PK. The effects of maxillary protraction therapy with or without rapid palatal expansion: a prospective, randomized clinical trial. *Am J Orthod Dentofacial Orthop* 2005;128:299-309.
13. de Alba y Levy JA, Caputo AA, Chaconas SJ. Effects of orthodontic intermaxillary Class III mechanics on craniofacial structures. Part I- photoelastic analysis. *Angle Orthod* 1979;49:21-8.
14. de Alba y Levy JA, Chaconas SJ, Caputo AA. Effects of orthodontic intermaxillary Class III mechanics on craniofacial structures. Part II- computerized cephalometrics. *Angle Orthod* 1979;49: 29-36.
15. Costa Pinho TM, Ustrell Torrent JM, Correia Pinto JG. Orthodontic camouflage in the case of a skeletal Class III malocclusion. *World J Orthod* 2004;5:213-23.
16. Janson G, de Souza JE, Alves FA, Andrade P Jr, Nakamura A, de Freitas MR, et al. Extreme dentoalveolar compensation in the treatment of Class III malocclusion. *Am J Orthod Dentofacial Orthop* 2005;128:787-94.
17. Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. *J Esthet Dent* 1999;11:311-24.
18. Moullas AT, Palomo JM, Gass JR, Amberman BD, White J, Gustovich D. Nonsurgical treatment of a patient with a Class III malocclusion. *Am J Orthod Dentofacial Orthop* 2006; 129(Suppl):S111-8.
19. McNamara JA Jr. A method of cephalometric evaluation. *Am J Orthod* 1984;86:449-69.