

Camouflage Treatment of a Severe Open Bite Case

Alev Yılmaz, DDS, PhD^{1,*} and Ayça Arman-Özçırpıcı, DDS, PhD²

KEY WORDS: camouflage treatment, open bite, high angle, Class II

INTRODUCTION

Skeletal open bite is a complex and multifactorial anomaly. There are many reasons for the occurrence of open bite, including skeletal abnormal growth pattern; dental, respiratory, neurologic, and habitual factors; and tongue posture and function.¹⁻⁶ Anterior open bite is one of the most difficult problems to treat in orthodontics. Various treatment modalities for the correction of an anterior open bite have been proposed such as extrusion of anterior teeth using intermaxillary elastics,⁷⁻⁹ multiloop edgewise archwire technique developed by Kim,¹⁰ inhibition of molar eruption using bite blocks and high-pull headgear during growth,¹¹⁻¹⁴ and extraction therapy.^{15,16} The most effective treatment option in adult patients is the repositioning of both the maxilla and mandible through a surgical correction.¹⁷⁻²² Although satisfactory results can be achieved with orthognathic surgery, the complexity, risks and costs of surgery are disadvantages of the surgical treatment. With the advent of skeletal anchorage, a number of studies were released to introduce the treatment of anterior open bite by intrusion of maxillary posterior teeth.²³⁻²⁹

This report presents the treatment and long-term stability of an adult case of a severe anterior open bite treated by means of extraction of the 4 first molars.

CASE REPORT

The patient was a 24-year-old woman. Her main complaint was inability of chewing and esthetic problems. Clinical examination revealed a convex profile with a long anterior facial height. She had

normal jaw function without temporomandibular joint dysfunctions. No facial asymmetry was observed. Intraoral examination presented a Class II molar relationship and open bite with no interarch tooth contact from left first molars to right first molars. Overjet and overbite were 8 mm and -10 mm, respectively. The upper dental midline was consistent with the facial midline, while the lower midline deviated 3 mm to the right. Cast analysis revealed 8 mm of crowding in the upper and 2 mm of crowding in the lower dentition (Fig. 1).

Lateral cephalometric analysis revealed a skeletal Class II and high-angle anomaly with an ANB angle of 8° and GoGn-SN angle of 45°. Upper and lower incisors were protrusive (Fig. 2; Table 1). The panoramic radiograph showed the presence of the upper and lower third molars. Her lower left first molar had undergone endodontic treatment, and all first and second molars had composite resin restorations (Fig. 3).

Treatment objective was to close the anterior open bite and attain Class I molar and canine relationship with ideal overjet and overbite while improving facial esthetics.

Three different treatment options were discussed with the patient. The first option was double jaw orthognathic surgery with maxillary posterior impaction, and the second was intrusion of the posterior teeth using miniplate anchorage. The third option was fixed orthodontic treatment with extraction. The patient refused both surgical procedures due to high cost and

***Corresponding author:** Yrd. Doç. Dr. Alev Yılmaz, Adnan Menderes Üniversitesi, Diş Hekimliği Fakültesi, Ortodonti Anabilim Dalı, 09100 Aydın-TÜRKİYE. Tel: +90 256 213 63 47 E-mail: alevcetinsahin@msn.com

To cite this article: Yılmaz A, Arman-Özçırpıcı A. Camouflage treatment of a severe open bite case *Turkish J Orthod.* 2014;27:9-15 (DOI: <http://dx.doi.org/10.13076/TJO-D-13-00011>) Date Submitted: September 2013. Date Accepted: March 2014. Copyright 2014 by Turkish Orthodontic Society

¹Assistant Professor, Adnan Menderes University, Department of Orthodontics, Faculty of Dentistry, Adnan Menderes University, 09100 Aydın-TURKEY

²Professor, Başkent University, Faculty of Dentistry, Department of Orthodontics, Ankara, Turkey



Figure 1. Pretreatment intraoral and extraoral photographs of the patient.

the risk of the surgery. As a result, the third alternative was chosen and it was decided to extract the 4 first molars and camouflage the skeletal problem.

Treatment Progress

Upper second molars were banded, and a transpalatal arch was prepared and placed on the upper

arch to help expand the maxillary second molars and prevent molar extrusion during treatment. The upper and lower first molars were extracted and the second and third molars were banded. Prescription .018-inch Roth metal brackets were bonded to all mandibular teeth and maxillary premolars. After levelling with NiTi archwires, .016 × .022-inch

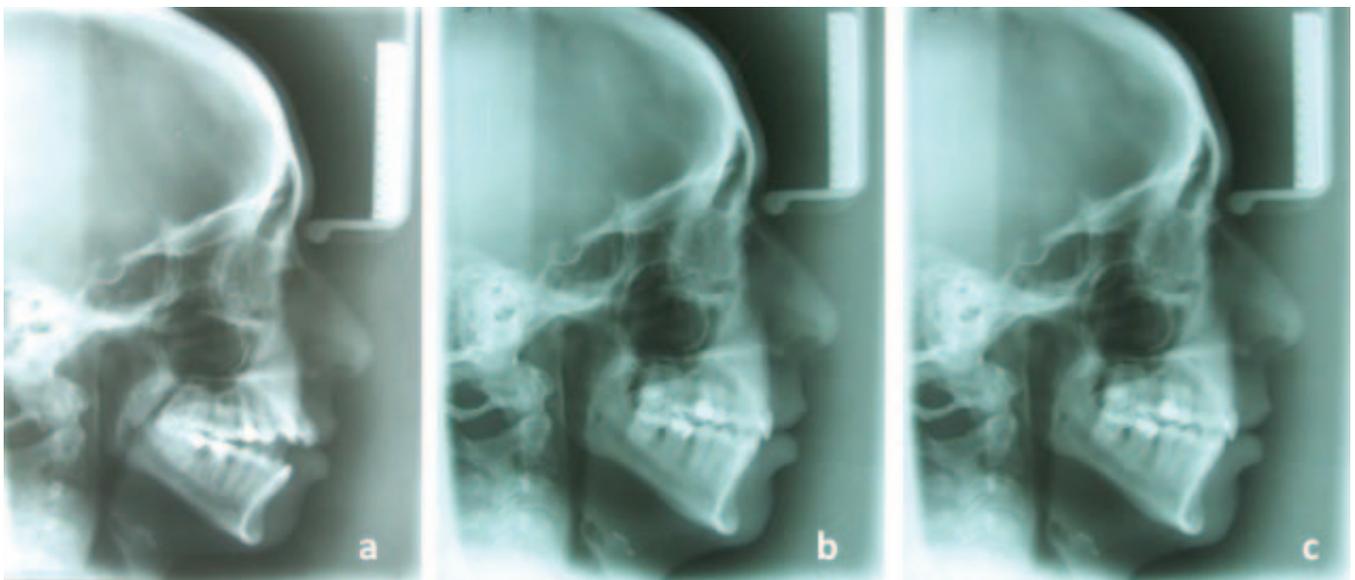


Figure 2. Posttreatment intraoral and extraoral photographs of the patient.

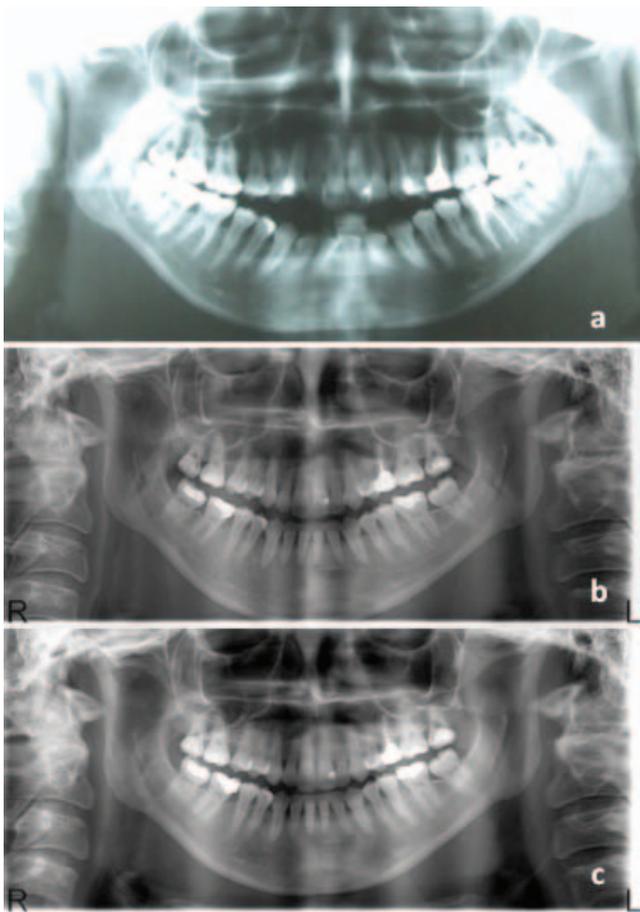


Figure 3. Postretention intraoral and extraoral photographs of the patient.



Figure 4. Pretreatment (a), posttreatment (b), postretention, and (c) cephalometric radiographs of the patient.

stainless steel archwires were placed. Maxillary premolars were retracted with maximum anchorage using closed coil springs, and then brackets were bonded to maxillary canines and incisors. After levelling of the anterior teeth, canines followed by the incisors were retracted. The mandibular extraction spaces were closed with moderate anchorage to establish a Class I molar relationship. Intermaxillary Class II elastics from lower third molars to upper canines were used to move the lower molars mesially.

After Class I molar and canine relationship was attained, the transpalatal arch was removed. At the finishing stage, .016-inch stainless steel wires were used for final detailing of the occlusion. Intermaxillary vertical elastics were used in the canine regions during the final stage of treatment. Fixed appliances were removed after 3 years of orthodontic treatment. Upper and lower Essix appliances were used for retention. The patient was asked to wear them for 1 year, full time for 6 months and at night thereafter.

Treatment Results

After 3 years of active treatment, the anterior open bite was closed and an acceptable occlusion was achieved (Fig. 4). The overbite was improved to 3 mm and the overjet to 2.5 mm, and Class I molar relationship was obtained. The lower dental midline

Table 1. Pretreatment (T1), posttreatment (T2), and postretention (T3) cephalometric measurements of the patient

	T1	T2	T3
Skeletal measurements			
SNA ($80 \pm 2^\circ$)	81	82	82
SNB ($78 \pm 2^\circ$)	73	74	74
ANB ($2 \pm 2^\circ$)	8	8	8
GoGn-SN ($32 \pm 6^\circ$)	45	43.5	44
FMA (25°)	35	35	35
Saddle angle ($123 \pm 5^\circ$)	126	126	126
Articular angle ($143 \pm 5^\circ$)	146	144	144
Gonial angle ($130 \pm 7^\circ$)	135	135	135
Sum of posterior angles ($396 \pm 3^\circ$)	407	405	405
SN/PP ($7 \pm 3^\circ$)	10	10	10
Dentoalveolar measurements			
1-NA (4 mm / $22 \pm 5^\circ$)	5.5/31	-2/6	-1.5/6
1-PP ($112 \pm 6^\circ$)	120	98	98
1-NB (4 mm / $22 \pm 5^\circ$)	8/28	7/27	7/28
IMPA ($90 \pm 3^\circ$)	87	87	88
Interincisal angle ($135.4 \pm 5.8^\circ$)	114	139	138
1-PP (mm)	25	31	31
6-PP (mm)	21	22.5	22
1-MP (mm)	35.5	38	38
7-MP (mm)	26	28	28.5
Overjet	7	2.5	2.5
Overbite	-10	3	3
Soft tissue measurements			
Upper lip-E line (-4 mm)	-0.5	-0.5	0
Lower lip-E line (-2 mm)	3.5	2	2

was corrected and brought to coincide with the facial midline.

Cephalometric analysis and superimpositions indicated a slight counterclockwise rotation of the mandible. The maxillary and mandibular molars moved mesially without extrusion. The maxillary and mandibular incisors showed retrusion and extrusion (Fig. 5; Table 1).

Twenty months after treatment, an acceptable occlusion was maintained without recurrence of the anterior open bite, indicating long-term stability of the occlusion (Fig. 6).

DISCUSSION

The open bite malocclusion is one of the most difficult problems to treat. Development of an effective treatment plan is dependent on proper diagnosis. This requires a careful cephalometric and clinical evaluation.³⁰ The patient's expectation for esthetic improvement is another important factor. A dental open bite can be treated with orthodontics alone, but severe skeletal open bite patients with unesthetic facial proportions require an orthognathic surgical approach to achieve a stable occlusion,

acceptable esthetics, and improved function.^{30,31} If a nonsurgical treatment option is chosen, the patient must be told that nonsurgical correction usually requires a longer treatment time and is more difficult, especially for stability.^{32,33}

Studies have reported successful treatment of open bite cases with the absolute intrusion of posterior teeth using skeletal anchorage.²³⁻²⁹ With intrusion of molars, it is possible to autorotate the mandible in a closing counterclockwise direction, close the open bite, and reduce the anterior facial height. Incisor exposure at rest and smile are important objectives to consider before treatment with intrusion. Patients who do not show sufficient incisor exposure should not be treated by molar intrusion, making the more conventional method of incisor extrusion a more suitable option for open bite correction.³⁴

Sarver and Weissman³⁵ discussed clinical results of nonsurgical treatment of adult open bite cases treated with extraction and incisor retraction. They emphasized that there are a limited number of patients who are convenient to this type of treatment. Patients should meet the following criteria: (1)

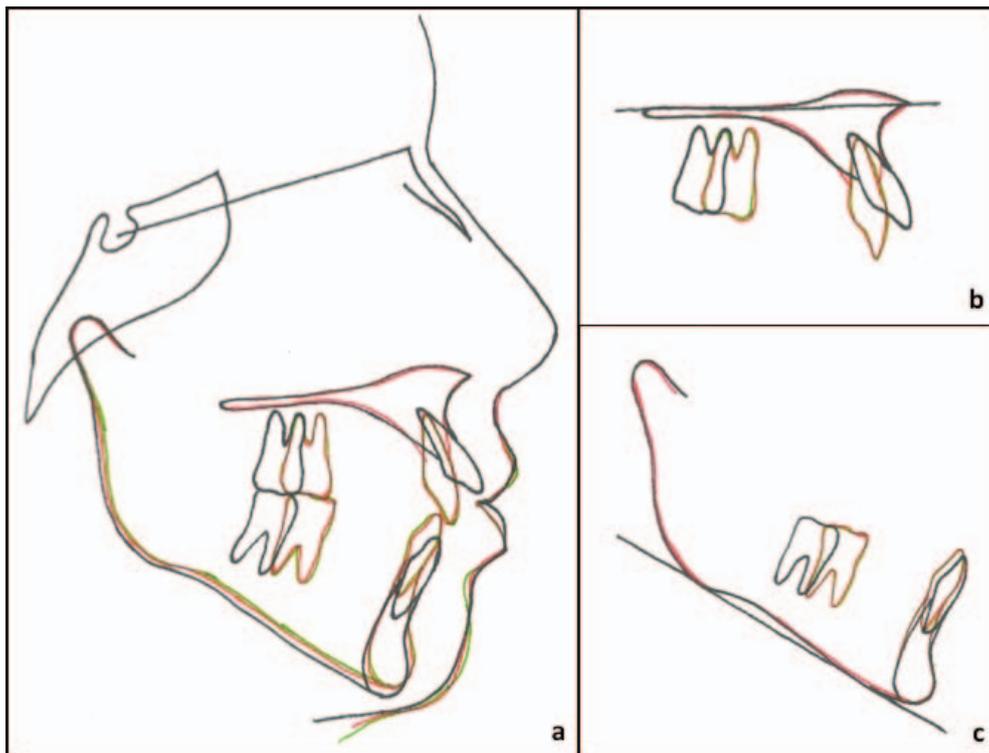


Figure 5. Pretreatment (a), posttreatment (b), postretention, and (c) panoramic radiographs of the patient.

proclined maxillary or mandibular incisors, (2) little or no gingival display on smile, (3) normal craniofacial pattern, and (4) no more than 2–3 mm of upper incisor exposure at rest.

The present case met the first, second, and fourth criteria; however, she displayed an abnormal facial pattern with an increased vertical plane angle and increased lower facial height.

It has been reported that when indicated, extraction of molars can be very effective in reducing facial height.^{16,30} Forward movement of the second molars allows the mandible to hinge upward and forward.^{36,37} Also, during the treatment, it is important to avoid the extrusion of maxillary and mandibular molars.³⁸

For this patient it was appropriate to extract the first molars because of the large restorations and endodontic treatment. A transpalatal arch was placed on the upper second molars to prevent the extrusion of upper teeth. Class II intermaxillary elastics were used in order to correct the Class II buccal relationship; however, light elastic forces and a more sagittal elastic component from lower second molars to upper canines and lateral incisors were used to decrease the molar extrusion resulting from the intermaxillary elastics.

Stability is the most important criterion for choosing the open bite treatment method, due to the difficulty of retaining the treatment results. It has been reported that extraction treatment has greater stability of the overbite than nonextraction treatment in open bite cases.³⁹ As explained by Beane,³⁰ placing retainers with occlusal coverage may be helpful in preventing further molar eruption. Also, the same author advises prolonged retention with fixed or removable retainers in most cases of open bite treatment.

For the present case, the final outcome of the treatment was great improvement in both function and esthetics. The patient was asked to use the upper and lower Essix appliances for 1 year. Twenty months after active orthodontic treatment, the overbite remained stable. But, a small gap between the lower molars and second premolars on both the left and right sides occurred in the postretention period. This may be due to insufficient correction of the axis of the teeth adjacent to the extraction area. Also, some lower incisor irregularity was seen. If a fixed lingual retainer had been bonded, the recurrence of lower anterior crowding could be avoided.

Furthermore, a gingival recession was seen in the labial surface of the mandibular left central incisor.



Figure 6. Total superimposition on SN line (a), maxillary superimposition on ANS-PNS line (b), and mandibular superimposition on inferior border of the mandible (c). (: pre-treatment, : post-treatment, : post-retention).

This may have been the result of gingival inflammation present during treatment. It has been recovered with periodontal treatment and oral maintenance.

The successful correction and stability of this difficult malocclusion depended on a careful clinical evaluation and proper treatment planning.

REFERENCES

- Sankey WL, Buschang PH, English J, Owen AH. Early treatment of vertical skeletal dysplasia: the hyperdivergent phenotype. *Am J Orthod Dentofacial Orthop.* 2000;118:317–327.
- Subtelny JD, Sakuda M. Open-bite: diagnosis and treatment. *Am J Orthod.* 1964;50:337–358.
- Burford D, Noar JH. The causes, diagnosis and treatment of anterior open bite. *Dent Update.* 2003;30:235–241.
- Arat ZM, Işeri H, Arman A. Differential diagnosis of skeletal open bite based on sagittal components of the face. *World J Orthod.* 2005;6:41–50.
- Arat ZM, Arman A. Treatment of a severe Class III open bite. *Am J Orthod Dentofacial Orthop.* 2005;127:499–509.
- Ngan P, Fields HW. Open bite: a review of etiology and management. *Pediatr Dent.* 1997;19:91–98.
- Rinchuse DJ. Vertical elastics for correction of anterior open bite. *J Clin Orthod.* 1994;28:284.
- Kucukkeles N, Acar A, Demirkaya AA, Evrenol B, Enacar A. Cephalometric evaluation of open bite treatment with NiTi arch wires and anterior elastics. *Am J Orthod Dentofacial Orthop.* 1999;116:555–562.
- Saito I, Yamaki M, Hanada K. Nonsurgical treatment of adult open bite using edgewise appliance combined with high pull headgear and class III elastics. *Angle Orthod.* 2005;75:277–283.
- Kim YH. Anterior openbite and its treatment with multiloop edgewise archwire. *Angle Orthod.* 1987;57:290–321.
- Kuster R, Ingervall B. The effect of treatment of skeletal open bite with two types of bite-blocks. *Eur J Orthod.* 1992; 14:489–499.
- Gurton AU, Akin E, Karacay S. Initial intrusion of the molars in the treatment of anterior open bite malocclusions in growing patients. *Angle Orthod.* 2004;74:454–464.
- Iscan HN, Sarisoy L. Comparison of the effects of passive posterior bite-blocks with different construction bites on the craniofacial and dentoalveolar structures. *Am J Orthod Dentofacial Orthop.* 1997;112:171–178.
- Alexander CD. Open bite, dental alveolar protrusion, Class I malocclusion: a successful treatment result. *Am J Orthod Dentofacial Orthop.* 1999;116:494–500.
- de Freitas MR, Beltrao RT, Janson G, Henriques JF, Cancado RH. Long-term stability of anterior open bite extraction treatment in the permanent dentition. *Am J Orthod Dentofacial Orthop.* 2004;125:78–87.

16. Aras A. Vertical changes following orthodontic extraction treatment in skeletal open bite subjects. *Eur J Orthod.* 2002; 24:407–416.
17. Swinnen K, Politis C, Willems G, De Bruyne I, Fieuws S, et al. Skeletal and dentoalveolar stability after surgical-orthodontic treatment of anterior open bite: a retrospective study. *Eur J Orthod.* 2001;23:547–557.
18. Epker BN, Fish L. Surgical-orthodontic correction of open-bite deformity. *Am J Orthod.* 1977;71:278–299.
19. Bell WH, Creekmore TD, Alexander RG. Surgical correction of the long face syndrome. *Am J Orthod.* 1977;71:40–67.
20. Proffit WR, Bailey LJ, Phillips C, Turvey TA. Long-term stability of surgical open-bite correction by Le Fort I osteotomy. *Angle Orthod.* 2000;70:112–117.
21. Hotokezaka H, Matsuo T, Nakagawa M, Mizuno A, Kobayashi K. Severe dental open bite malocclusion with tongue reduction after orthodontic treatment. *Angle Orthod.* 2001;71:228–236.
22. Woods MG, Nanda RS. Intrusion of posterior teeth with magnets. An experiment in growing baboons. *Angle Orthod.* 1988;58:136–150.
23. Prosterman B, Prosterman L, Fisher R, Gornitsky M. The use of implants for orthodontic correction of an open bite. *Am J Orthod Dentofacial Orthop.* 1995;107:245–250.
24. Kato S, Kato M. Intrusion of molars with implants as anchorage: a report of two cases. *Clin Implant Dent Relat Res.* 2006;8:100–106.
25. Erverdi N, Keles A, Nanda R. The use of skeletal anchorage in open bite treatment: a cephalometric evaluation. *Angle Orthod.* 2004;74:381–390.
26. Sugawara J, Baik UB, Umemori M, Takahashi I, Nagasaka H, et al. Treatment and posttreatment dentoalveolar changes following intrusion of mandibular molars with application of a skeletal anchorage system (SAS) for open bite correction. *Int J Adult Orthodon Orthognath Surg.* 2002; 17:243–253.
27. Sherwood KH, Burch JG, Thompson WJ. Closing anterior open bites by intruding molars with titanium miniplate anchorage. *Am J Orthod Dentofacial Orthop.* 2002;122: 593–600.
28. Xun C, Zeng X, Wang X. Microscrew anchorage in skeletal anterior open-bite treatment. *Angle Orthod.* 2007;77:47–56.
29. Park YC, Lee SY, Kim DH, Jee SH. Intrusion of posterior teeth using mini-screw implants. *Am J Orthod Dentofacial Orthop.* 2003;123:690–694.
30. Beane RA. Nonsurgical management of the anterior open bite: a review of the options. *Semin Orthod.* 1999;5:275–283.
31. Tanaka E, Iwabe T, Kawai N, Nishi M, Bona-Dalla D, et al. An adult case of skeletal open bite with a large lower anterior facial height. *Angle Orthod.* 2005;75:465–471.
32. Hiller ME. Nonsurgical correction of Class II open bite malocclusion in an adult patient. *Am J Orthod Dentofacial Orthop.* 2002;122:210–216.
33. Denison TF, Kokich VG, Shapiro PA. Stability of maxillary surgery in open bite versus non-open bite malocclusions. *Angle Orthod.* 1989;59:5–10.
34. Park YC, Lee HA, Choi NC, Kim DH. Open bite correction by intrusion of posterior teeth with miniscrews. *Angle Orthod.* 2008;78:699–710.
35. Sarver DM, Weissman SM. Nonsurgical treatment of open bite in nongrowing patients. *Am J Orthod Dentofacial Orthop.* 1995;108:651–659.
36. Ortial JP. Vertical dimension and therapeutic choices. *Am J Orthod Dentofacial Orthop.* 1995;108:432–441.
37. Vaden JL. Nonsurgical treatment of the patient with vertical discrepancy. *Am J Orthod Dentofacial Orthop.* 1998;113: 567–582.
38. Cardiel Rios SA. Class II correction in a severe hyperdivergent growth pattern, bilateral open bite and oral compromise. *Angle Orthod.* 2005;75:870–880.
39. Janson G, Valarelli FP, Beltrão RT, de Freitas MR, Henriques JF. Stability of anterior open-bite extraction and nonextraction treatment in the permanent dentition. *Am J Orthod Dentofacial Orthop.* 2006;129:768–774.