ABO CASE REPORT

Treatment of a Class I bimaxillary protrusive malocclusion with a high mandibular plane angle: An American Board of Orthodontics case report

J. Mark Griffies, DDS,[a] and Charles E. Meyers, DDS, MS[b]

El Paso, Tex., and Dublin, Ga.

A case report of the orthodontic treatment of a male adolescent with a Class I bimaxillary protrusive malocclusion, complicated by a vertical growth pattern and high mandibular plane angle. Treatment consisted of extraction of maxillary second premolars, mandibular first premolars, use of a transpalatal bar, occipital pull headgear, and light wire mechanics. An acceptable result was achieved, with a decrease in the facial axis, decrease in lip strain, and an attractive full smile. This case report was presented to the American Board of Orthodontics in partial fulfillment of the requirements for the certification process conducted by the Board. (Am J Orthod Dentofacial Orthop 2000;117:60-7)

The patient is a normally developing 11-year 10-month-old male of Panamanian descent who desires "straight teeth." He is presently taking Ritalin to control his hyperactivity and lengthen his attention span. His dental health has been maintained through routine annual dental visits, and he presently maintains fair plaque control. He does not admit to any oral habits. However, tongue thrust/posturing is suspected. Hereditary influence is probable because his mother presents with a similar malocclusion (Figs 1, 2, 3, and 4).

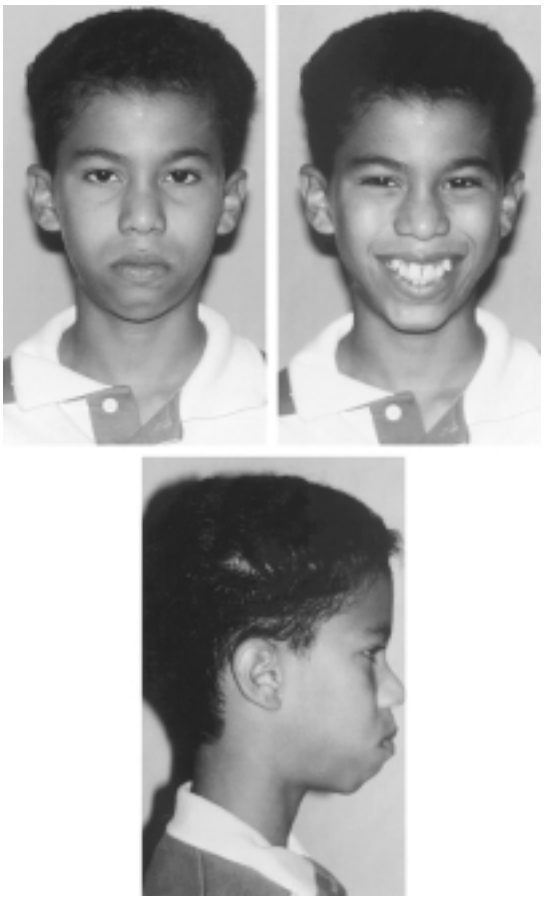

Fig 1. Pretreatment facial photographs.

DIAGNOSIS

The patient presents with facial symmetry, a convex profile, acute nasolabial angle, 4 mm of maxillary incisor display on repose, and pronounced mentalis strain on lip closure. The dental casts show a Class III molar relationship with partially erupted maxillary canines. There is 2.5 mm of overjet, 1 mm of overbite, a level curve of Spee, and slight maxillary midline shift to the left of the facial midline. The maxillary right and left primary second molars are present. A moderate mandibular arch length discrepancy and slight asymmetry are noted in the canine region. Bolton analysis of tooth size discrepancies reveals an estimated excess of 2 mm in the maxillary arch. Articulated models reveal a left lateral shift of 0.3 mm and a distraction of 0.25 mm anterior and 0.75 mm inferior at the level of the condyles. Temporomandibular joint (TMJ) sounds and symptoms cannot be detected clinically and are reported absent by the patient. Numerous wear facets are noted on the maxillary and mandibular posterior

The views and opinions of the authors expressed herein do not necessarily reflect those of the U.S. government or the U.S. Army.

[a]Lieutenant Colonel, U.S. Army.

[b]In private practice in Dublin, Ga.

Reprint requests to: J. Mark Griffies, DDS, 217 Sheridan Rd., El Paso, TX 79906

0889-5406/2000/$12.00 + 0 **8/5/89749**

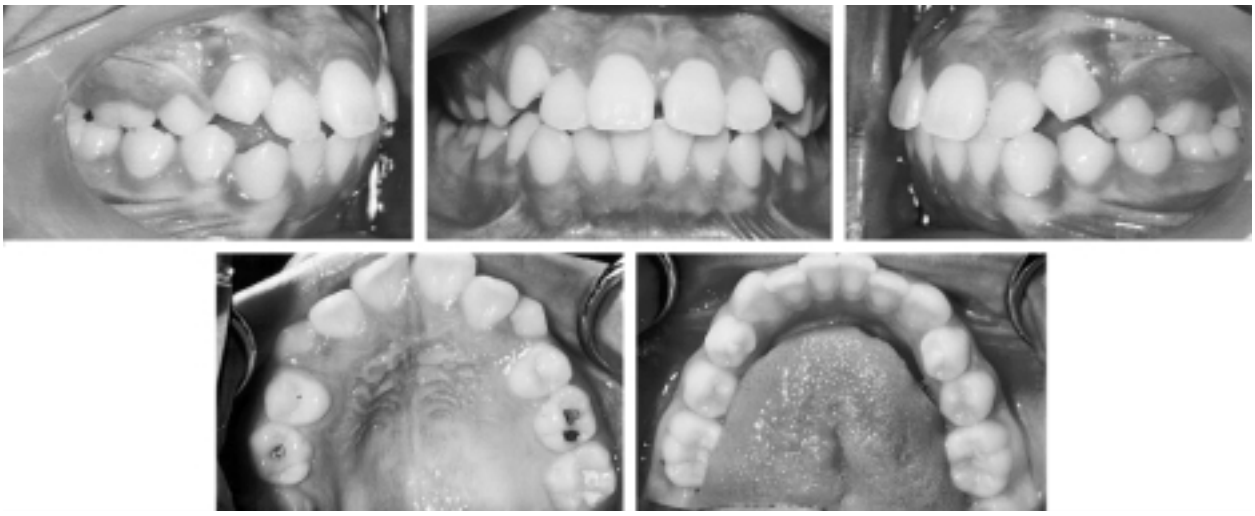

Fig 2. Pretreatment intraoral photographs.

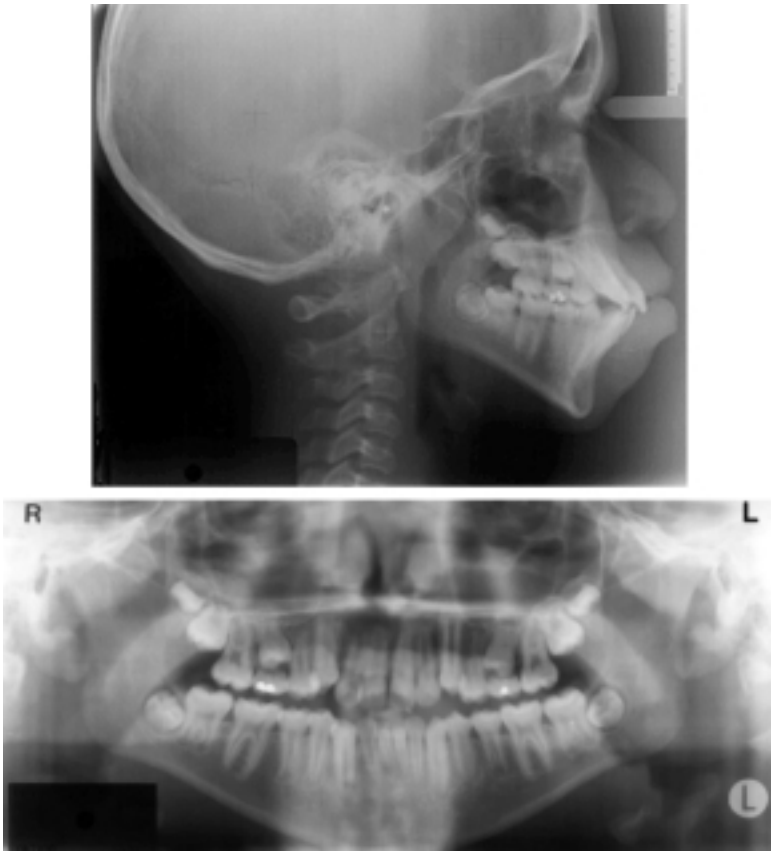

Fig 3. Pretreatment cephalometric and panoramic radiographs.

occlusal surfaces. Panoramic radiographic analysis show all teeth present. All unerupted third molar teeth are forming normally with no root formation at present. The maxillary second premolars are erupting normally at about 85° to the occlusal plane. Anterior-superior flattening of both the right and left condyles is noted. Cephalometric analysis reveals a skeletal Class II relationship. This skeletal relationship appears to be due to a slightly protrusive maxilla and the clockwise rotation of the mandible. The high mandibular plane angle

Fig 4. Pretreatment cephalometric tracing.

(FMA, SNGoGn), decreased facial axis, and low anterior to posterior face height ratio indicate a vertical growth pattern and open bite tendency prior to orthodontic treatment.

TREATMENT OBJECTIVES

1. Correct to Class I molar and canine relationship.
2. Maintain or reduce current anterior vertical dimension.
3. Correct mandibular crowding and gain mandibular and maxillary dental symmetry.
4. Establish ideal overjet and overbite with a canine guided mutually protected occlusal scheme.
5. Establish good facial balance with lips competent in repose and upper incisor display of approximately 3 mm. Reduce protrusive lips and mentalis strain on closure.

TREATMENT PLAN

The patient and parents are counseled to the possible need for surgical intervention, should his open bite increase during treatment. All treatment mechanics will be designed for maximum control of the vertical dimension.

1. Placement of a transpalatal bar to the maxillary first molars and start occipital pull headgear to maintain vertical control during leveling and alignment.
2. Extract maxillary second premolars and mandibular first premolars to aid in the correction of the molar relationship and allow maximum retraction of the lower anteriors.
3. Placement of maxillary and mandibular orthodontic appliances and use light wires to level and align both arches.
4. Reproximate maxillary anteriors during finishing to equalize the maxillary and mandibular mesial-distal tooth sizes.
5. After appliance removal, place a gnathologic positioner for final finishing (3 weeks) then maxillary and mandibular removable retainers. Plan full-time retainer wear for 1 year then nightly for 6 months.
6. Reevaluate third molars for extraction.

Fig 5. Posttreatment facial photographs.

TREATMENT PROGRESS

The mandibular first premolars and maxillary primary second molars were removed with subsequent placement of maxillary and mandibular orthodontic appliances. The maxillary canines and second premo-

Fig 6. Posttreatment intraoral photographs.

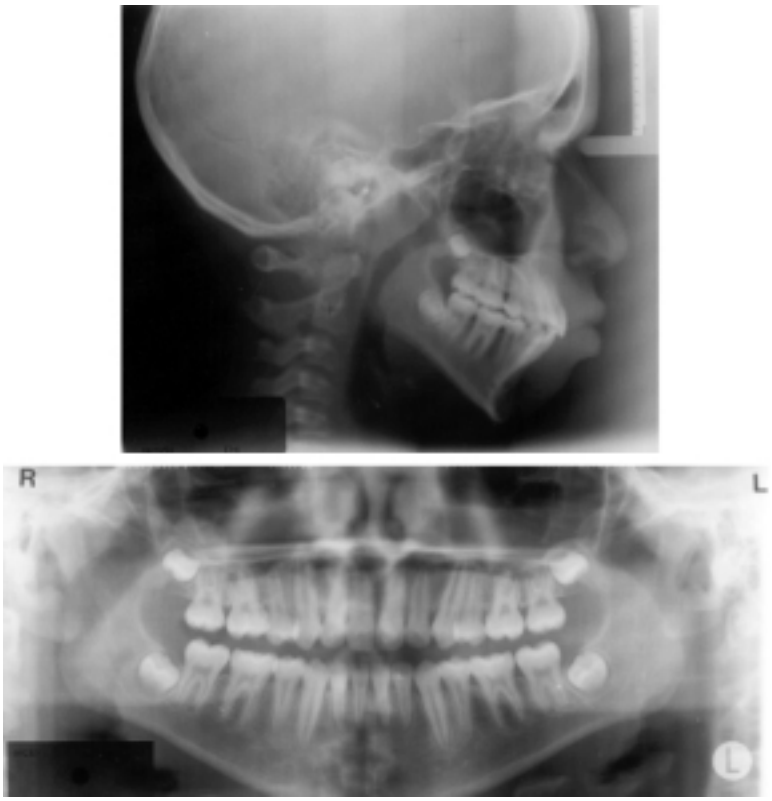

Fig 7. Posttreatment cephalometric and panoramic radiographs.

lars were bypassed on the initial bonding. Occipital pull headgear and a transpalatal bar were started on this initial appointment and continued during the first 6 months of leveling and alignment. During initial alignment, the mandibular incisors were uprighted slightly to deepen the overbite and the maxillary canines were brought into the arch using a 0.0175 twisted stainless steel overlay wire to these teeth. The maxillary second premolars were removed 5 months into treatment and maxillary/mandibular 0.019×0.025 double keyhole

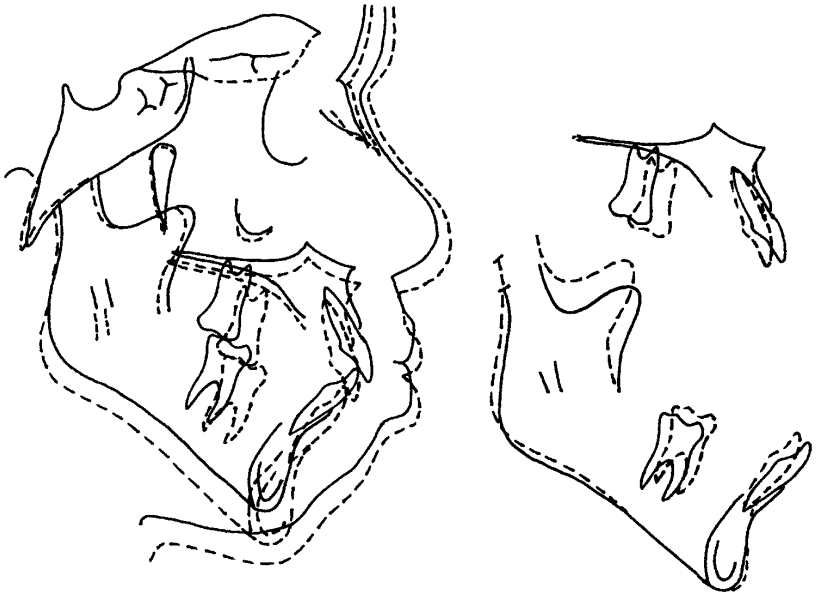

Fig 8. Pretreatment and posttreatment cephalometric superimpositions.

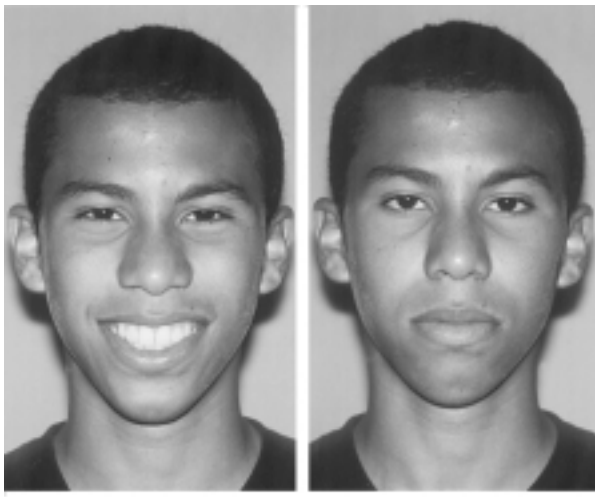

Fig 9. Two-year posttreatment facial photographs.

closing loops placed. The occipital pull headgear and transpalatal bar were discontinued at this time to allow mesial movement of the maxillary posterior teeth. Space closure was completed on the lower arch after 4 months, and the closing loop arch wire was replaced with a 0.018 stainless steel to relevel the arch. Space closure was completed in the upper arch after 6 months and a 0.017×0.025 stainless steel arch wire placed. One year into treatment, progress records were assessed and indicated further arch coordination was required with the need to reposition several brackets. During the next 6 months, finishing procedures included the reproximation of maxillary anterior teeth and vertical adjustment of canines to improve occlusion. The final occlusion was established with the use of short posterior Class III elastics (1/8 inch, 4 oz) for 3 weeks and then debonding both arches and placing a gnathologic positioner for 3 weeks. A maxillary circumferential retainer and mandibular removable retainer were subsequently placed. Total treatment time was 18 months (Figs 5, 6, 7, and 8). Appointments were at 4 to 6 week intervals, with good cooperation and oral hygiene by the patient.

RESULTS ACHIEVED

Esthetically, the patient completed treatment with an attractive full smile, teeth aligned, midlines correct, and less than 1 mm of gingiva showing above the central incisors when smiling. The final convex profile has had a favorable improvement, with the retraction of the protrusive maxillary incisors; the lips are full, competent, no longer strained, and in good balance.

Fig 10. Two-year posttreatment intraoral photographs.

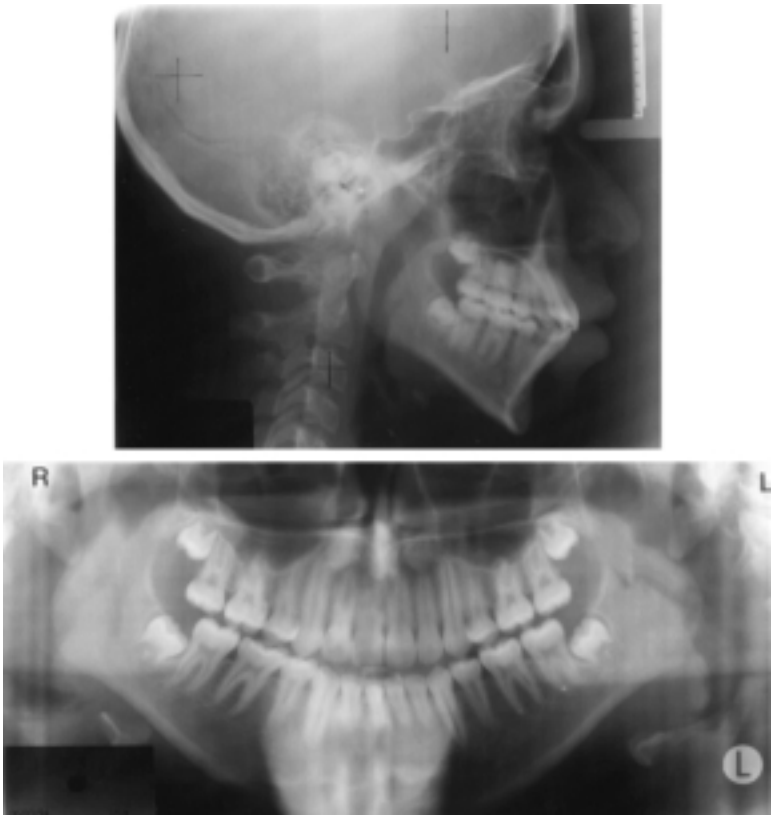

Fig 11. Two-year posttreatment cephalometric and panoramic radiographs.

Functionally, the Class III molar relationship was corrected to a Class I position, and the canines and premolars are in a solid Class I relationship. The overjet was maintained at 2.5 mm and the overbite increased to 2.5 mm. The midlines are coincident, with a canine-guided occlusion and well-seated posterior occlusion.

Probably the most dramatic change seen on the cephalometric radiograph is the large amount of condylar growth (Table I, Figs 7 and 8). The

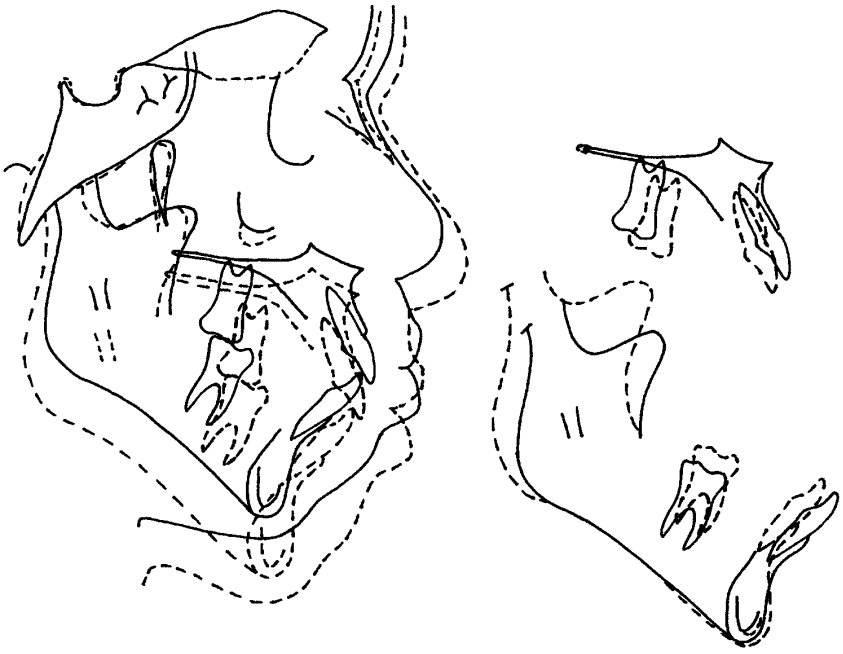

Fig 12. Pretreatment and 2-year posttreatment superimpositions.

Table I. Cephalometric summary

Area of study	*Measurement*	*Norms*	*(A)*	*(B)*	*(C)*
Cranial base	N-S-Ar	123°	112	114	116
	S-N	71 mm	64	66	67
Maxilla to cranial base	SNA	82°	88	87	85
	A perpendicular	0 mm	1	1	0
Mandible to cranial base	SNB	80°	78	80	79
	NPO-FH	88°	82	84	84
Maxillo-mandibular relations	ANB	2°	10	7	6
	Wits	0 mm	1	1	–1
Vertical height	LFH	47°	52	52	54
	FMA	25°	37	37	34
	SN-GoGn	32°	41	41	40
	S-Go:N-Me	62°	58	58	59
Maxillary and mandibular incisor position	U1-Na(mm)	4 mm	7	5	7
	U1-Na(deg)	22°	24	17	23
	U1-Max Pl	110°	120	113	115
	U1 to SN	103°	112	104	107
	L1-NB(mm)	4 mm	15	11	12
	L1-NB(deg)	25°	40	31	37
	IMPA	90°	100	90	96
	L1-A pog	2 mm	9	5	7
	U1-L1(deg)	135°	107	124	115
Soft tissue	S-line				
	Upper lip	0 mm	9	7	6
	Lower lip	0 mm	15	13	10
	Nasolabial angle	100°	87	91	96

patient's growth pattern was predicted to be primarily vertical, down the facial axis of 81°. The composite superimposition shows growth primarily down the facial axis but almost twice the amount predicted with approximately 5 mm of horizontal growth achieved. It appears that the facial axis did close approximately 1°, which was desirable in this open bite tendency case. The open bite did not express itself, partly due to the use of a transpalatal bar, and occipital headgear during the first 6 months of treatment, light wire mechanics, and the large amount of ramal growth achieved. The upper and lower molars erupted slightly, but the ramal growth was great enough to compensate for their eruption and keep the bite closed.

The 2-year posttreatment records show continued vertical and horizontal growth with a slight increase in mandibular incisor irregularity and return of the maxillary midline diastema. Overall the occlusion remained stable (Figs 9, 10, 11, and 12).