

CDABO CASE REPORT

Orthodontic correction of a Class II Division 1 subdivision right open bite malocclusion in an adolescent patient with a cervical pull face-bow headgear

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HISTORY AND CAUSE

This patient was a circumpubertal, well-nourished, healthy 12-year-6-month-old white male with a chief complaint of "My top teeth stick out too far" (Fig 1). His medical history was noncontributory, and his dental history consisted of sporadic dental cleanings. The patient exhibited hypocalcification of the incisal edges of all anterior teeth, fair oral hygiene, gingival recession on the lower centrals, and a hindering lower labial frenum that pulled tissue away from the teeth when the lip was pulled forward. X-rays and probing revealed no periodontal disease or other pathologic condition (Fig 2). The patient presented with a daily thumb habit, a 7 mm open bite, associated tongue thrust, and lip incompetence, although he strained to remain habitually closed. Overjet was approximately 7 mm. Neither parent presented with an open bite malocclusion and thus heredity probably played no part in the cause of this malocclusion. The thumb habit was the etiologic factor of this malocclusion.

DIAGNOSIS

The patient presented in the permanent dentition with a Class II (end on) and a Class I molar and canine relationship on the right and left, respectively (Fig 3). The maxillary arch was constricted transversely and exhibited an excessive curve of Spee (mm). The mandibular arch was U-shaped with 2 mm of crowding and exhibited a reverse curve of Spee of 1 mm. The large open bite measured 7 mm from the incisal edge of the lower centrals to the incisal edge of the upper centrals (-7 mm overbite). The patient exhibited a thumb habit, a tongue thrust, and lip incompetence with men-

talis strain. Both maxillary and mandibular incisors were protrusive and contributed to the patient's lip procumbency and lip incompetence (Figs 4 and 5). The tooth to lip relationship at rest was -1 mm. The mandibular dental midline was 1.5 mm to the right of the maxillary dental midline. Spacing in the maxillary arch was 2 mm and crowding in the mandibular arch was 2 mm.

SPECIFIC OBJECTIVES OF TREATMENT

Maxilla

The maxilla at the initiation of treatment was positioned normally in all three planes of space. The goal was to maintain its relative A-P position and to allow normal growth to occur in the transverse and vertical dimensions.

Mandible

The mandible was normally positioned in all three planes of space. The goal was to allow normal growth to occur.

Maxillary Dentition

The maxillary dentition exhibited an excessive curve of Spee that contributed to the negative tooth to lip relationship at rest. The goal was to improve the vertical position of the incisors, hold the present position of the maxillary midline (which is coincident with the soft tissue midline), and develop the arch transversely by expanding 2.0 to 2.5 mm.

Mandibular Dentition

The goal was to correct the crowding and upright the lower lateral incisors to the present position of the centrals and therefore improve the lip protrusion. Correct the reverse curve of Spee to the present level of the posterior mandibular occlusal plane and to correct the mandibular midline to coincide with the maxillary midline. The canine and molar widths are to remain unchanged.

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Fig 1. A-C, Pretreatment facial photographs.

Occlusion

Treat to a Class I skeletal and dental relationship with normal overbite and overjet and establish a canine protected occlusion.

Facial Esthetics

Accept normal growth changes in the facial profile. Decrease upper and lower lip procumbency.

TREATMENT PLAN

A consultation would be performed with both parents and patient to alleviate thumb habit before the placement of appliances. Based on the patient's cooperation, treatment would commence. A nonextraction treatment was planned with a reevaluation after 6 months of treatment to decide on the possible need for extractions. A periodontal evaluation would be performed to address the recession on the mandibular centrals. Maxillary appliances and cervical pull face-bow would be placed and then 2 to 3 months after the periodontal procedure the mandibular appliances would be placed. Teeth would be leveled and aligned in order to get into large stainless steel arch wires in both arches, which would precede the use of Class II midline and vertical elastics. The occlusion would be finished and detailed and appliances removed. A maxillary Hawley retainer and a mandibular bonded canine to canine retainer would be placed immediately after appliances were removed for retention purposes.



Fig 2. Pretreatment panoramic x-ray film.

TREATMENT PROGRESS

A consultation with the patient and parents was performed in order to stop the thumb habit before the placement of fixed appliances. The patient agreed to stop his daily habit for a consecutive 21 days and mark it on a calendar that he would bring to the next appointment. The patient was very motivated for treatment and was made aware that appliances would not be placed until the cessation of the habit. Three weeks later the habit was resolved and spacers were placed. A periodontal evaluation was done to address the recession on the mandibular centrals, and a labial graft and frenectomy were to be performed 3 months before appliances were placed on the mandibular arch. The maxillary arch was bonded with special bracket heights that allowed placement on the anterior teeth in a more gingival position and on the posterior teeth in a more incisal position. Brackets in both arches were placed in this way. A cervical pull face-bow was fitted to the

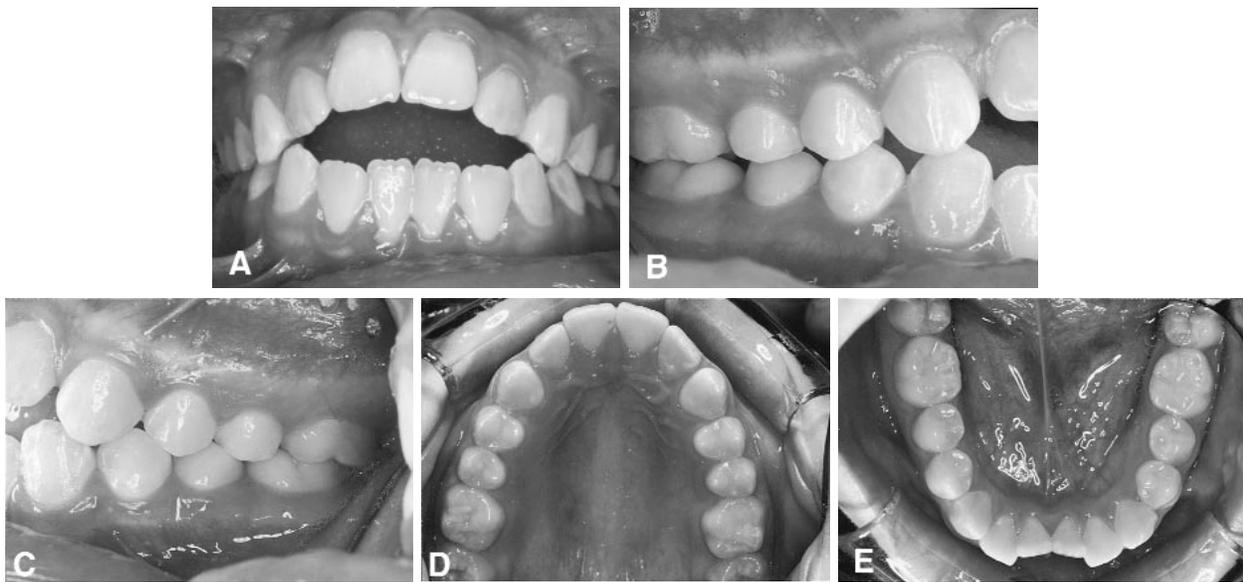


Fig 3. Pretreatment intraoral photographs.



Fig 4. Pretreatment cephalometric x-ray film.

maxillary arch 1 month after appliances were placed and was worn for 13 months during the night. Arch wire sequence in the maxilla consisted of 0.016 nickel titanium to alleviate rotations; 0.016 stainless steel with reverse curve of Spee to level; 0.017 × 0.025 stainless steel to finish. Arch wire sequence in the mandible consisted of 0.017 × 0.025 D-rect (a flexible twisted rectangular stainless steel wire) to maintain torque in the mandibular incisors. A -5° prescription bracket on the mandibular incisors also aided torque control. Then a

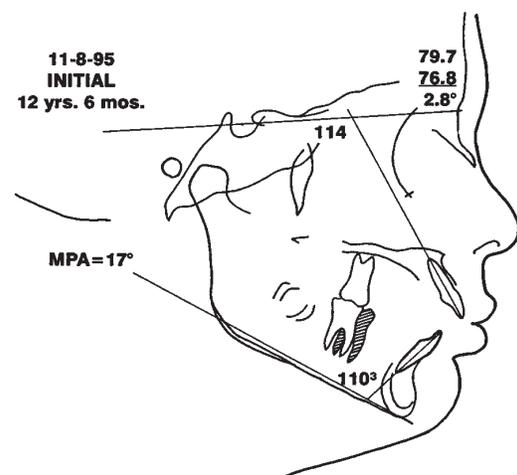


Fig 5. Pretreatment tracing.

0.017 × 0.025 titanium-molybdenum alloy was used, and the mandibular anterior teeth were stripped from distal of the canine to distal of the canine. The third wire in the mandibular arch was a 0.017 × 0.025 stainless steel. A Class II elastic (worn on the right only) with a midline elastic was worn for 8 weeks for 24 hours daily (elastics = 1/4 to 6 oz). Buccal posterior wires were then cut distal to the canines and finishing elastics were worn in a zig zag manner for 2 weeks for 24 hours daily. An anterior box elastic (3/16 to 6 oz) was worn from the maxillary centrals to the mandibular laterals for 1 week for 24 hours daily. The appli-

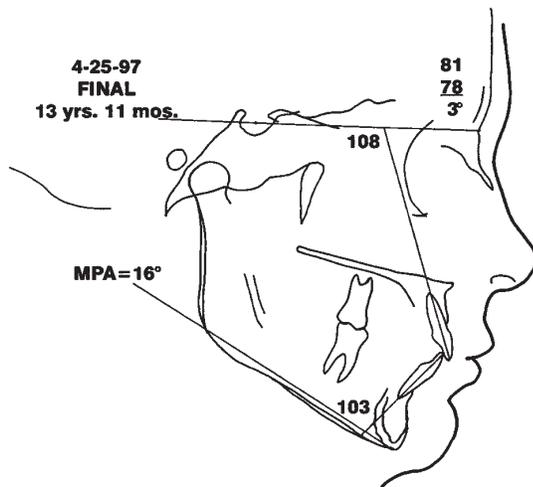


Fig 6. Posttreatment tracing.

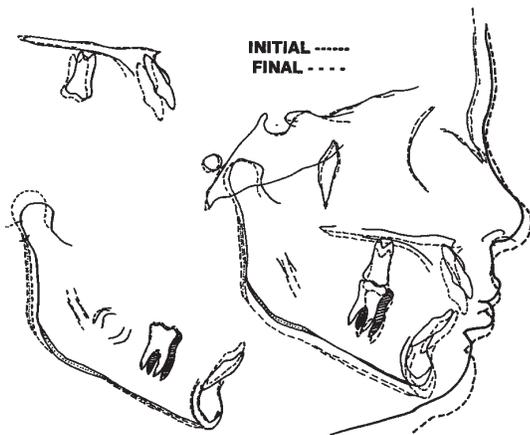


Fig 7. Composite tracing pretreatment and posttreatment.

ances were removed and retainers placed. Active treatment duration was 14 months.

RESULTS ACHIEVED

Maxilla

The A-P growth of the maxilla was held, although A point still came forward some (Figs 6, 7, and 8). However, compared with the amount of growth that occurred in the mandible and soft tissue, we would have expected to see a considerably greater amount of maxillary growth if the headgear had not been used.

Mandible

Significant growth of the mandible occurred.



Fig 8. Posttreatment cephalometric x-ray film.



Fig 9. Posttreatment panoramic x-ray film.

Maxillary Dentition

The vertical relationship of the incisors to the lip was improved to achieve a normal 2 mm tooth to lip relationship at rest (Incision-Stomion). The maxillary midline was maintained, and the canine and molar widths were expanded 3 mm. The molars were distalized approximately 1 mm, and vertical eruption was approximately 1 mm (Fig 7). All spacing was eliminated and good root parallelism was achieved (Fig 9).

Mandibular Dentition

The lower incisors were uprighted 7° and extruded to meet the level of the posterior occlusal plane. The midline was corrected to coincide with the maxillary midline and the soft tissue midline. The canine and molar transverse widths were maintained. The right lower molar came forward approximately 1 mm and the left molar was essentially held. Both molars extruded a slight amount. Crowding was alleviated except for a slight rotation on the left second premolar that could have been improved. Good root parallelism was achieved.

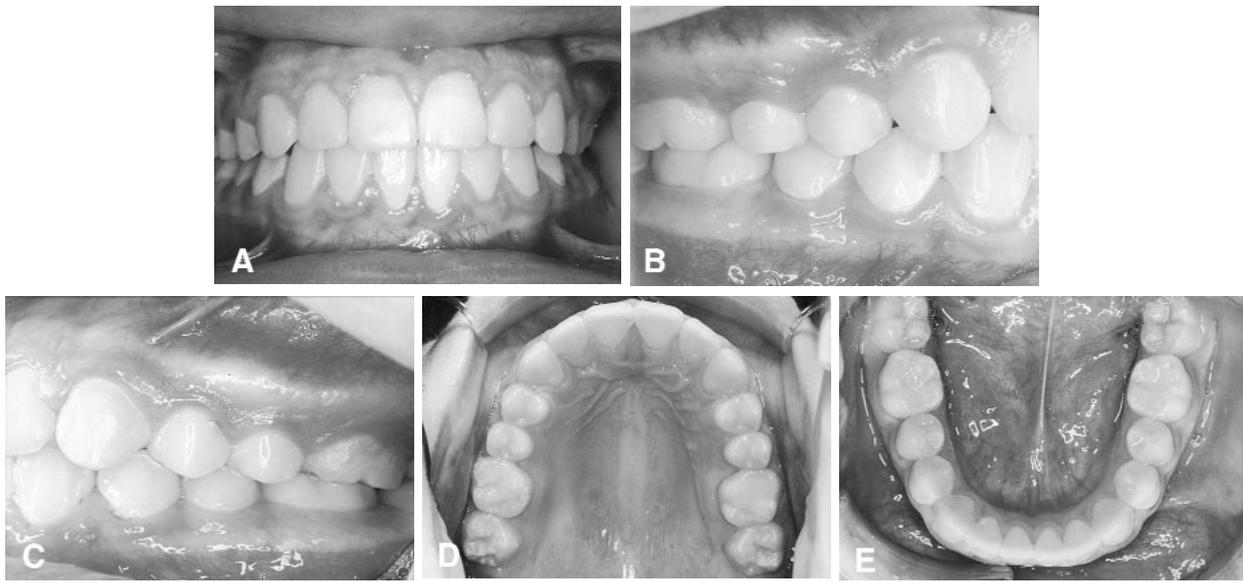


Fig 10. A to E, Posttreatment intraoral photographs.

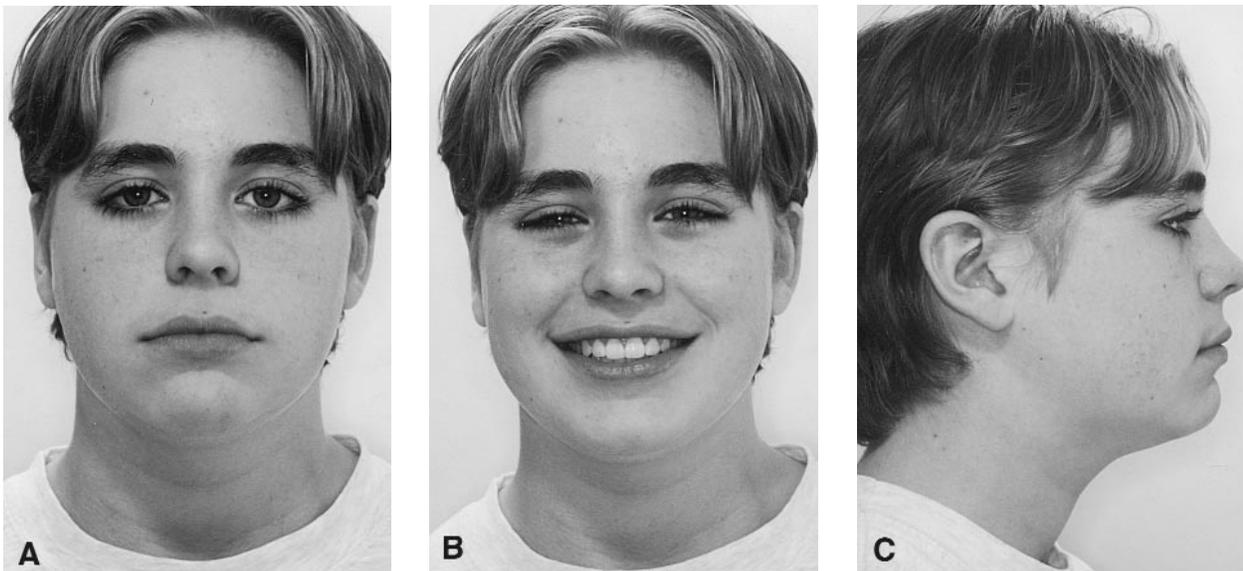


Fig 11. Posttreatment facial photographs.

Occlusion

A Class I relationship with normal overbite (2 mm) and overjet (2 mm) was established (Fig 10). A canine protected occlusion was achieved.

Facial Esthetics

A nice improvement in the facial esthetics and good facial balance was achieved (Fig 11). The lip procum-

bency was greatly improved and the mentalis strain was relieved.

RETENTION

A maxillary wrap-around retainer was delivered to the patient and will be worn nighttime only. The retainer is designed with a small hole in the anterior superior palate to entice the tongue to maintain a normal

Table I. Cephalometric summary

Cephalometric area of study	Candidate's measurements	(A) Pretreatment records (mean)	(A') Progress	(B) Posttreatment records (mean)	(C)
Cranial base	S-N	83.9 mm (70.1)		85.3 mm (71.2)	
	N-S-Ar	124.2° (125.6)		127.4 (125.9)	
Maxilla to cranial base	S-N-A	79.7° (81.2)		81.3° (81.2)	
	Maximum depth	93.0° (90.0)		93.1° (90.0)	
Mandible to cranial base	S-N-B	76.8° (77.3)		77.9° (77.5)	
	N-Pg/FH (Facial)	90.5° (82.6)		91.9° (82.3)	
Maxillomandibular relations	A-N-B	2.8° (3.9)		3.4° (3.7)	
	A-B/OP (Witts)	1.4 mm (-0.4)		0.7 mm (-0.7)	
Vertical relations	N-ANS	56.2 mm (48.9)		60.6 mm (50.8)	
	ANS-Me	65.9 mm (63.6)		66.4 mm (64.5)	
	Go-Me/FH(MPA)	16.7° (21.3)		16.1° (21.3)	
	S-N/Go-Gn	24.8° (23.0)		22.5° (23.0)	
	S-Gn/FH (Y axis)	51.0° (62.2)		50.3° (62.6)	
Maxillary and mandibular incisor position	U1/S-N	114.2° (104)		108.1° (104)	
	U1/N-A	34.6° (22.8)		26.8° (22.1)	
	U1/A-Pg	12 mm (3.5)		7.4 mm (3.5)	
	L1/N-B	38.8° (26.1)		30.2° (26.6)	
	L1/A-Pg	5.1 mm (2.1)		4.1 mm (2.1)	
	U1/L1	103.8° (127)		119.6° (127)	
Soft tissue	L1/Go-Me (IMPA)	110.2° (95.9)		102.9 (95.9)	
	G1'-SN-Pg'	10.4° (6.7)		7.9° (6.7)	
	Nasolabial	109° (110)		106.4° (110)	
	Ls(pSn-Pg')	3.6 mm (3.7)		3.6 mm (3.4)	
	Li(pSn-Pg')	4.4 mm (3.0)		1.8 mm (2.5)	
	Inc-Stm	-1 mm (2.0)		2.0 mm (2.0)	
Other	Pg-Pg'	16.6 mm (11.7)		18.6 mm (12.5)	
	N-A-Pg (convexity)	3.0° (3.9)		4.4° (3.9)	
	N-S/OP	15.3° (16.2)		16.4° (15.6)	

Note: Norms based on Denver Growth Study (age and sex matched).

position in the mouth and discourage tongue thrusting. A bonded canine to canine retainer was placed and will remain fixed until the third molars are resolved.

FINAL EVALUATION

A nice improvement in both dental and facial esthetics was achieved. A Class I dental relationship

was established, and the maxilla was held while significant mandibular jaw growth aided in the correction of the soft tissue profile. The open bite was alleviated, and proper overbite and overjet was achieved.