

CDABO CASE REPORTS

Nonsurgical treatment of a Class III malocclusion with maxillary skeletal retrusion using rapid maxillary expansion and reverse pull headgear

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PATIENT HISTORY AND CAUSE OF CONDITION

The patient presented as a 13-year 1-month-old white girl (Fig. 1). Her chief concern was "My teeth are crooked and going all over the place. I want straight teeth." Her medical history revealed no contraindications to orthodontic therapy. The cause of her malocclusion was a combination of genetic and environmental factors.

DIAGNOSIS

The patient demonstrated a Class III malocclusion with 30% overbite, 1 mm overjet, a centered upper dental midline, and a lower dental midline 2 mm to the left. She had a straight profile, a protrusive lower lip, and an interlabial gap of 3 mm (Figs. 1, 2, and 3). Space analysis indicated approximately 5.5 mm maxillary and 3 mm mandibular space deficiency. The maxillary arch was constricted. Radiographs revealed all third molars developing normally in their crypts. The patient had an ANB angle of -4° , an SNA angle of 72° , an SNB angle of 76° , an SN-MP angle of 31° , and an FMA angle of 21° (Fig. 4). The maxillary incisors were 7 mm anterior to the N-A line with an angle to SN of 102° , whereas the mandibular incisors were positioned on the N-B line with an angle to FH of 77° . There was a slight shift anteriorly when the patient was manipulated from centric relation to centric occlusion. These findings

were consistent with a diagnosis of Class III malocclusion with maxillary skeletal retrusion.

TREATMENT OBJECTIVES AND INITIAL TREATMENT PLAN

The treatment objectives consisted of expanding the constricted maxilla, preventing further mandibular horizontal growth, improving incisal angulation, and achieving Class I molar and canine relationships with ideal overbite and overjet. The initial treatment plan included using rapid maxillary expansion (RME) to expand the maxilla, bonding the maxillary anteriors and flaring them to eliminate the functional shift, banding and bonding the mandibular arch with zero degree brackets, maintaining the curve of Spee, placing a lower lingual holding arch (LLHA), retracting the lower right canine into the leeway space to gain canine symmetry, and using reverse pull headgear (RPHG) for a chin cup effect and for maxillary arch protraction.

In anticipation of the possibility of unfavorable growth or lack of compliance, a surgical treatment plan consisting of a high LeFort procedure to improve maxillary facial contours (after RME and leveling of both arches) was presented.

TREATMENT PROGRESS

A banded RME and LLHA were placed. The RME was activated to a total of 4.5 mm over a period of 6 weeks and was then held passively for 6 months. Immediately after the active phase of the maxillary expansion, RPHG force was initiated. After 4 months of excellent headgear compliance, the maxillary incisors were bonded (0.022 inch edge-wise appliance) and a 0.014 stainless steel sectional wire was placed. At the same appointment, the mandibular arch was bonded, and a 0.016 Nitinol

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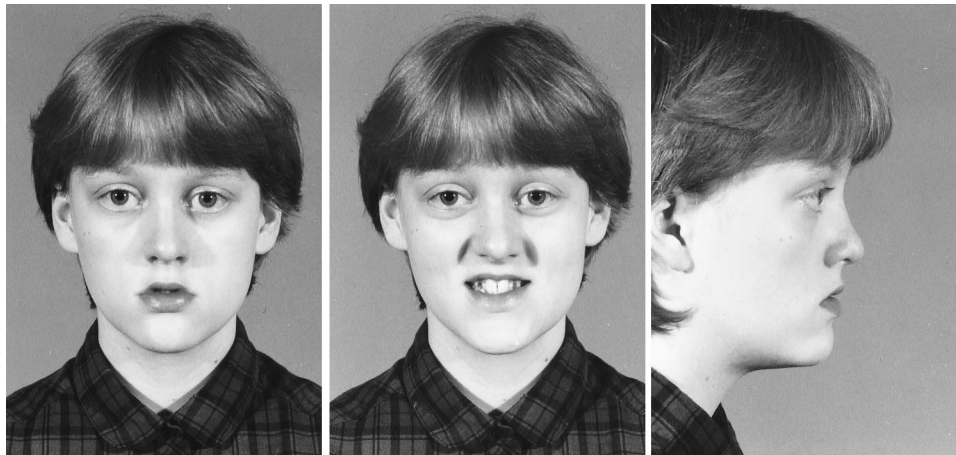


Fig. 1. Pretreatment facial photographs.

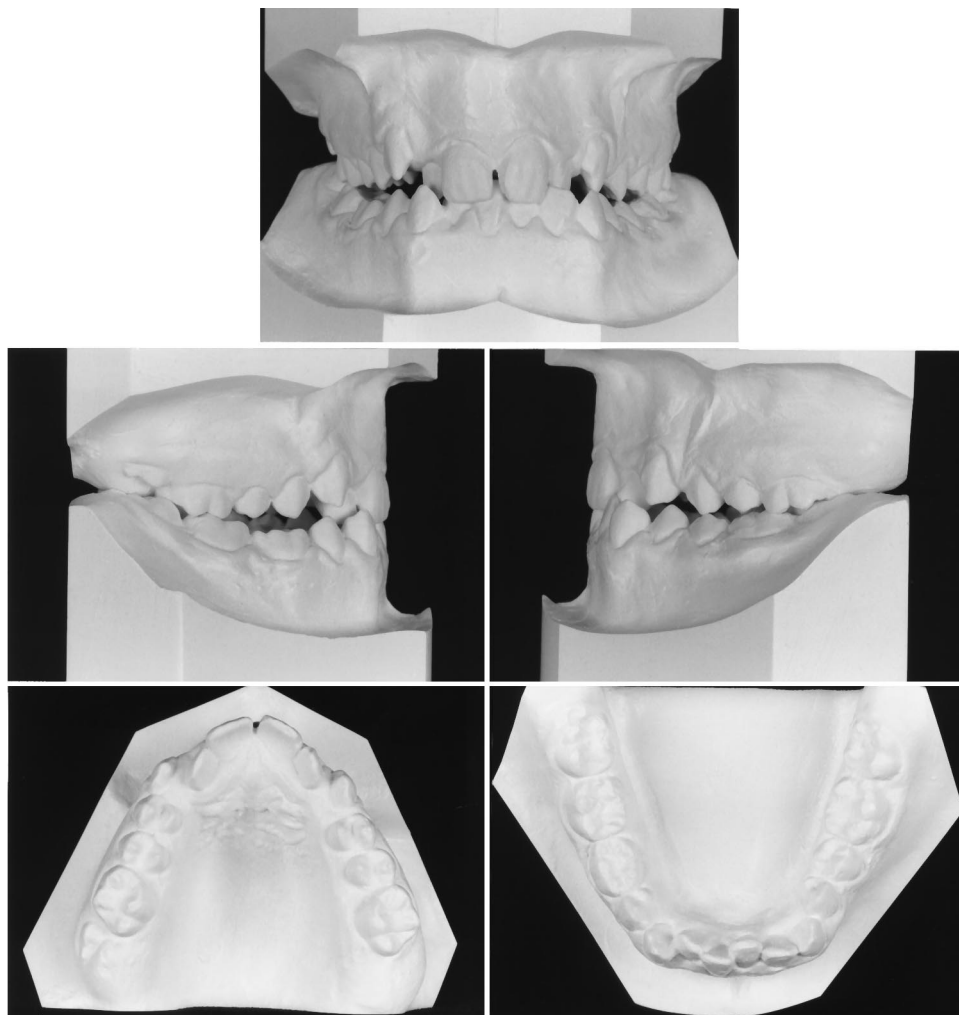


Fig. 2. Pretreatment study casts.

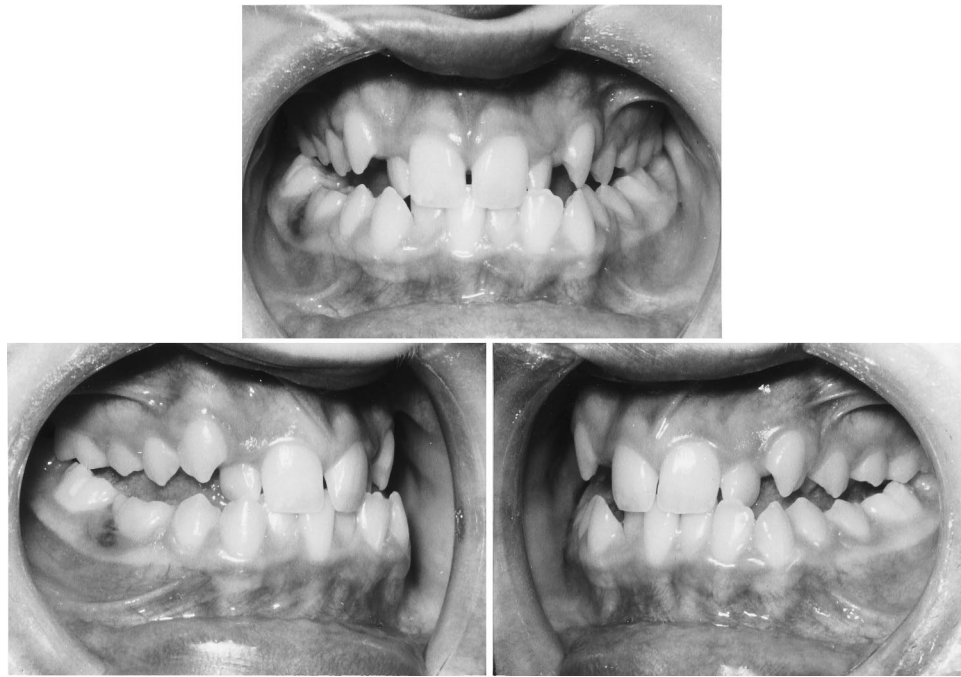


Fig. 3. Pretreatment intraoral photographs.

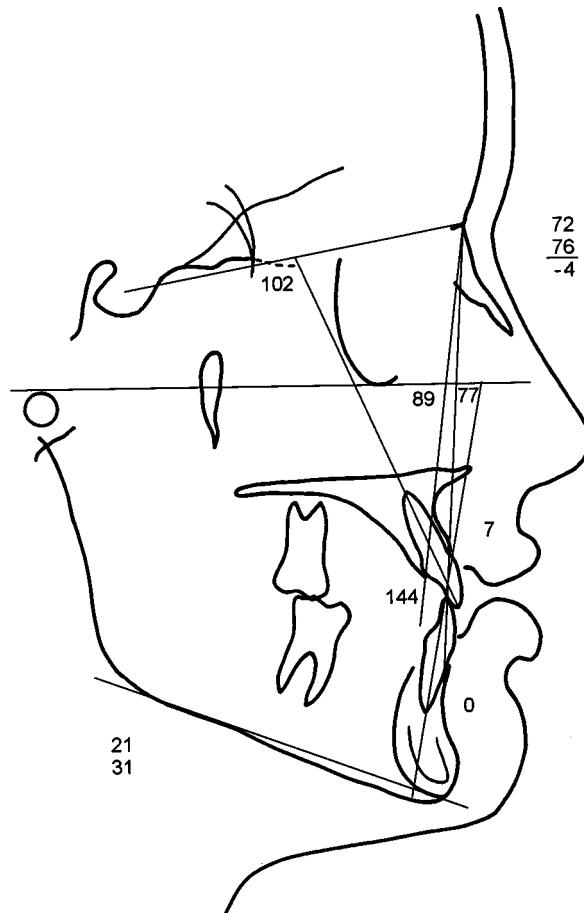


Fig. 4. Pretreatment cephalometric tracing.

wire was placed. Two months after bonding, RPHG was discontinued, the RME and LLHA were removed, a removable transpalatal arch (TPA) was placed, maxillary premolars were bonded, and a 0.016 stainless steel maxillary archwire and 0.016 stainless steel stopped mandibular archwire were placed.

Nine months after initial appliance placement, bands were placed on all second permanent molars and 0.018 inch stainless steel upper and lower archwires were placed. For 4 months, maxillary and mandibular archwires were progressively increased to 0.018 × 0.025 inch stainless steel wires. Class III elastics were used on the right side, whereas bilateral triangular elastics were concurrently used at the canines. Elastics were discontinued after a period of 2 months. The appliances were removed, and maxillary and mandibular Hawley retainers were placed.

RESULTS ACHIEVED

The patient's facial shape elongated. The interlabial gap decreased to 0 mm as a result of maxillary lip growth. The maxilla was unchanged in position. The mandible rotated in a downward and backward position as a result of mandibular molar extrusion and mandibular growth; SNB angle decreased 2° (Figs. 5, 6, and 7). The maxillary incisors were extruded whereas the molars were extruded and protracted. The mandibular incisor crowns were torqued labially and extruded. The mandibular molars were uprighted and extruded (Figs. 8 and 9, Table I).



Fig. 5. Posttreatment facial photographs.

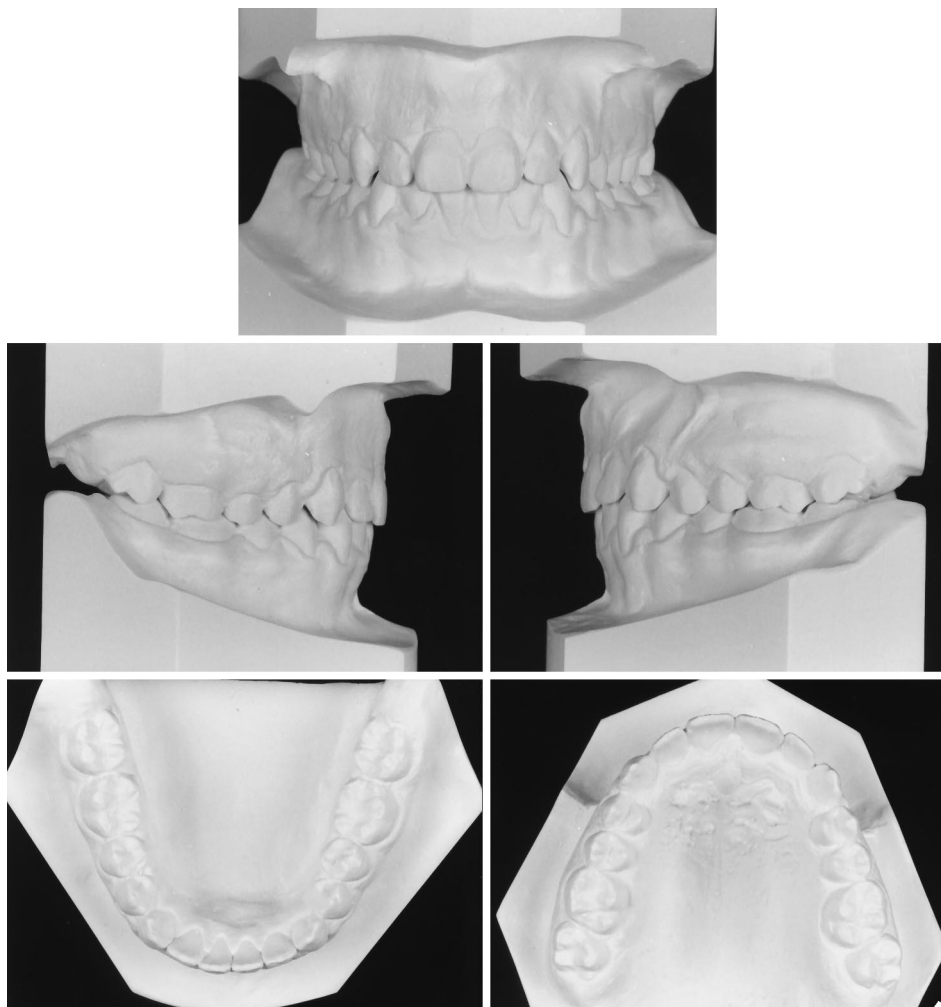


Fig. 6. Posttreatment study casts.



Fig. 7. Posttreatment intraoral photographs.

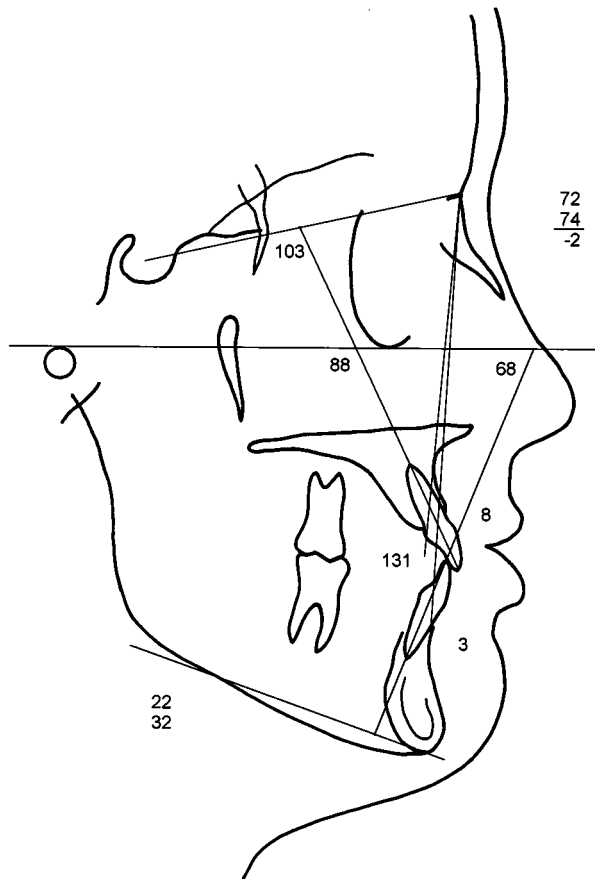


Fig. 8. Posttreatment cephalometric tracing.

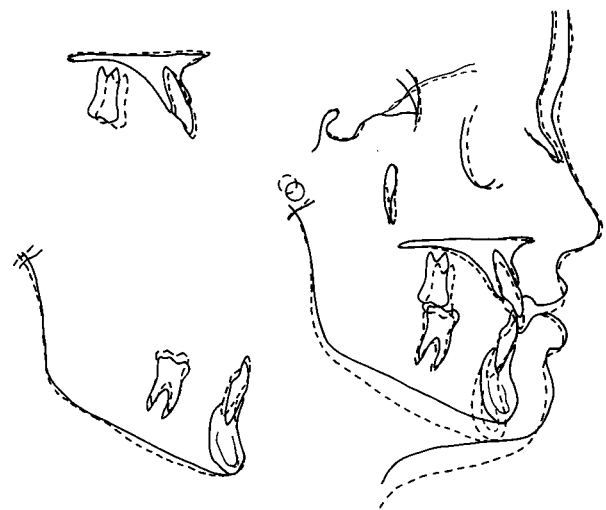


Fig. 9. Pretreatment and posttreatment superimposed cephalometric tracings.

The patient completed her treatment with well-interdigitated Class I molars and canines with approximately 30% overbite and 2 mm overjet. There was bilateral canine guidance during lateral excursions. Temporomandibular joint function was normal, and the centric relationship was coincident with centric occlusion. Radiographically, good root parallelism was achieved, and there was minimal root resorption. The third molars were present and developing.

Table I. Summary of cephalometric analysis

Measurement	Standard	Initial	Deband
SNA	82	72	72
FH-NA	90	82	83
SNB	80	76	74
FH-NPog	88	89	88
ANB	2	-4	-2
SN-MP	32	31	32
FMA	25	21	22
LFH/TFH	55%	58%	60%
I:SN	104	102	103
I:NA	4mm	7mm	8mm
I:FH	65	77	68
I:NB	4mm	0	3
I:I	131	144	131
ILG	0mm	3mm	0mm
Mx lip:I at rest	2mm	5mm	5mm

RETENTION

Immediately after fixed appliance removal, the patient was placed in maxillary and mandibular

temporary retainers. After 1 month, the patient was given maxillary and mandibular Hawley retainers. Retention check visits have occurred for 1 year with minor labial bow adjustments. Occlusion has not changed since the time of debanding.

FINAL EVALUATION

All treatment objectives were achieved without the need of surgery. Facial contours improved as a result of mandibular rotation, although perinasal deficiency remains. The RPHG aided in maxillary posterior protraction.

Stability prognosis is favorable because of the patient's age and cooperation with retainer wear. Third molar evaluation will continue during development and eruption.

We thank Dr. Jose Arango, a former resident for his care of this patient.

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