Case Report KP

Treatment of a severe openbite excessive vertical pattern with an eclectic non-surgical approach

By Lloyd E. Pearson, DDS, MSD

This 7-year 10-month-old Caucasian female presented with a severe Class II, division 1 malocclusion. Her Class II molar relationship was more severe on the right side, her lower dental and skeletal midlines were shifted to the right and the left side of her mandible appeared slightly longer than the right. Her maxilla was prominent and narrow, arch length was moderately lacking, and she had a large anterior openbite with mouth breathing, thumb sucking and tongue thrusting habits.

The patient's mother described the problem accurately when she wrote that her daughter had an "openbite, crooked bottom teeth, and mouth too small for (her) large teeth." With a lower facial height of 75 mm, measured from anterior nasal spine to menton, the patient's lower face was 15 mm longer than the mean for girls her age,[1-3] and 10 mm longer than the mean for adult women. Her mandibular length, from condylion to prognathion, was 112 mm, well in excess of Harvold's mean of 105 mm. At 89 mm, her maxilla was 4 mm longer than the mean for her age and her maxillary-mandibular length difference was 24 mm, or 4 mm larger than the mean. With less vertical discrepancy, these measurements would indicate a prognathic tendency. The patient had a large interlabial gap, lip incompetence, a short upper lip, over-erupted maxillary incisors and lip strain upon closure.

Treatment objectives

1. Obtain a symmetrical Class I occlusion for optimum function and long-term dental health.

Figure 1
Pretreatment photographs at 7 years 10 months

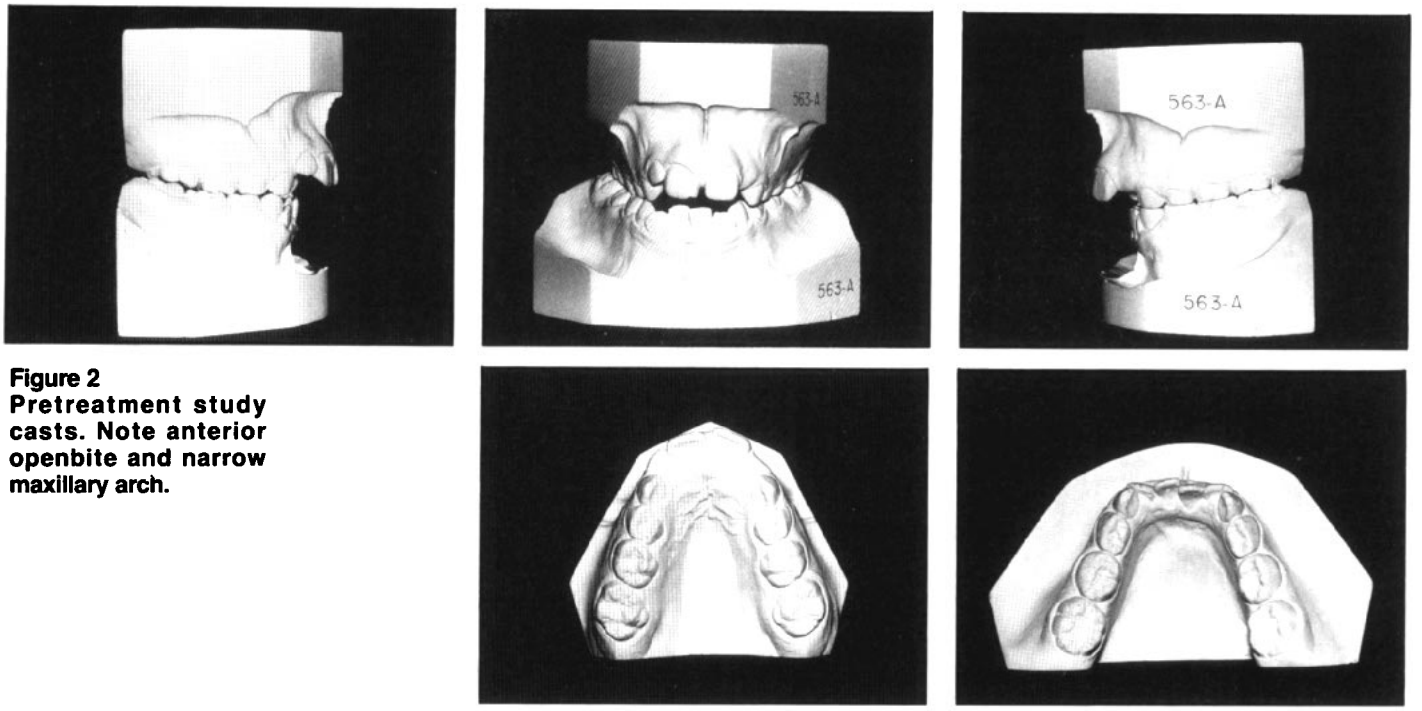


Figure 2
Pretreatment study casts. Note anterior openbite and narrow maxillary arch.

Figure 3
Pretreatment panoramic radiograph

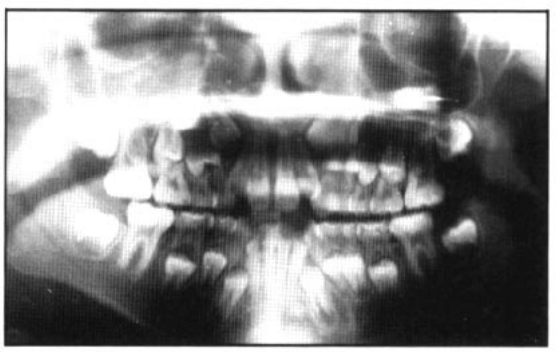
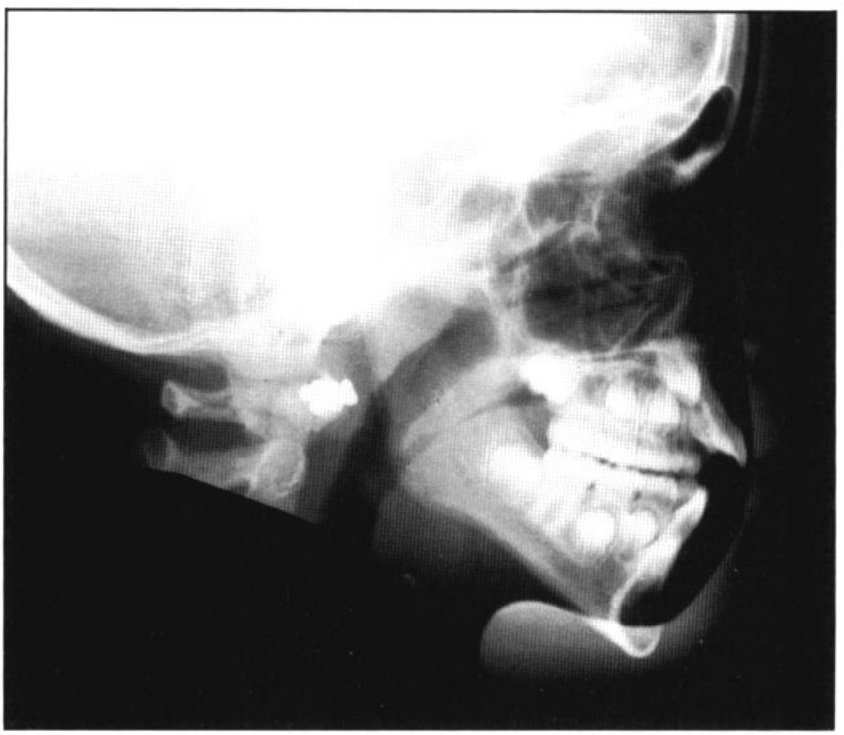


Figure 4
Headfilm at 7 years 10 months



2. Correct the posterior crossbite and widen the narrow maxilla without extruding the posterior teeth.
3. Maintain or reduce the excessive lower anterior facial height.
4. Close the anterior openbite without extruding the anterior teeth.
5. Avoid orthognathic surgery if possible, or limit to genioplasty.

Treatment plan

Because of the severe vertical problems, as well as the very constricted maxilla, intrusive forces would need to be applied to the posterior teeth to prevent their elongation during treatment. Sutural expansion was especially needed and special measures were indicated to avoid the maxillary buccal extrusion that accompanies this procedure. Closure of the openbite would be accomplished by intrusion of the posterior teeth rather than by extrusion of the anteriors since the maxillary anteriors were already slightly over-erupted.

Treatment progress

Vertical-pull chin cup therapy,[4] directing 16 ounces of force as far to the anterior on each side as possible, was used 12 hours per day throughout the entire treatment. This appliance helped control the excessive lower facial height and prevented extrusion of the posterior teeth. Two rapid palatal expansion appliances were used to widen the maxilla from 25.7 mm to 35.5 mm in 6 weeks. Two appliances were needed because the palate was initially too narrow

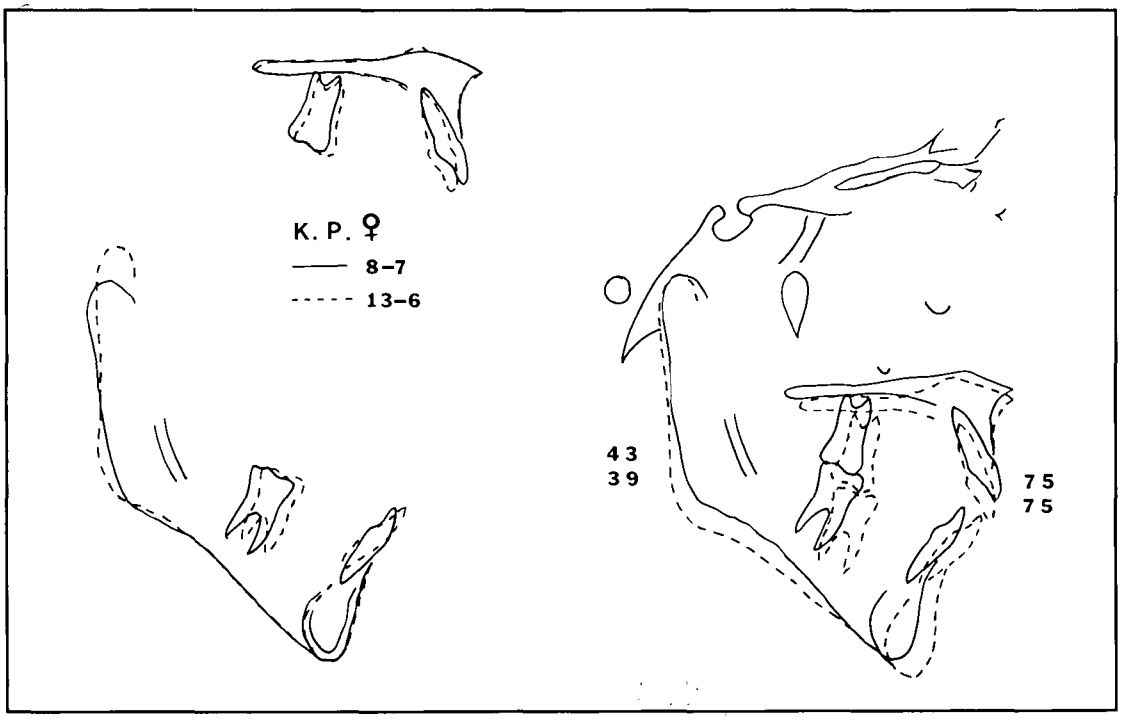


Figure 5
Superimposed cephalometric tracings at 8 years 7 months and 13 years 6 months. Note excellent mandibular growth.

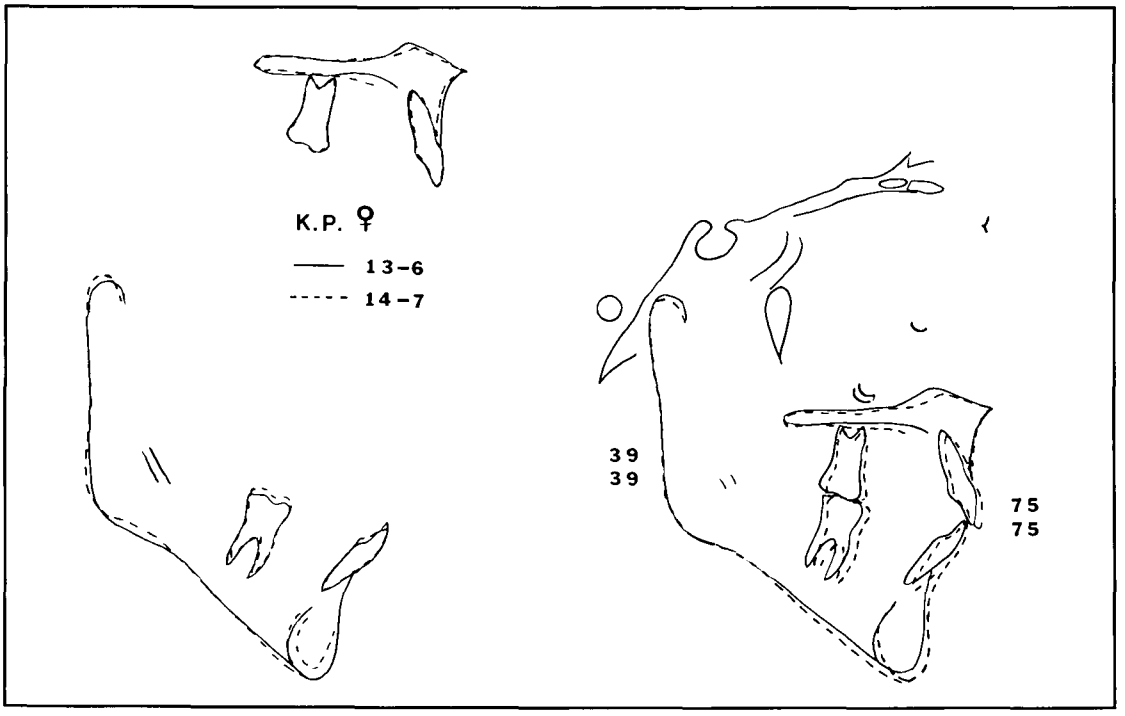


Figure 6
Superimposed cephalometric tracings at 13 years 6 months and 14 years 7 months.

to permit placement of an appliance of normal width. A maxillary removable retainer with occlusal coverage was used in combination with the vertical-pull chin cup for 5 months. Occlusal coverage on the maxillary retainer helped prevent posterior vertical eruption while maintaining the increased maxillary width and allowing the lower arch to expand spontaneously.[5]

A mandibular bite block, worn for 10 months, applied intrusive forces to the posterior teeth and helped close the openbite. The vertical-pull chin cup therapy was continued during this time and a maxillary palatal retainer was worn as well. The patient's bite deepened until the mandibular incisors were striking the palate and it became necessary to depress the mandibular anteriors. The progress cephalometric radiograph showed an actual 3 mm reduction in the ANS-Menton measurement, from 75 mm to 72 mm. A mandibular anterior depression arch was combined with the maxillary bite plate and ver-

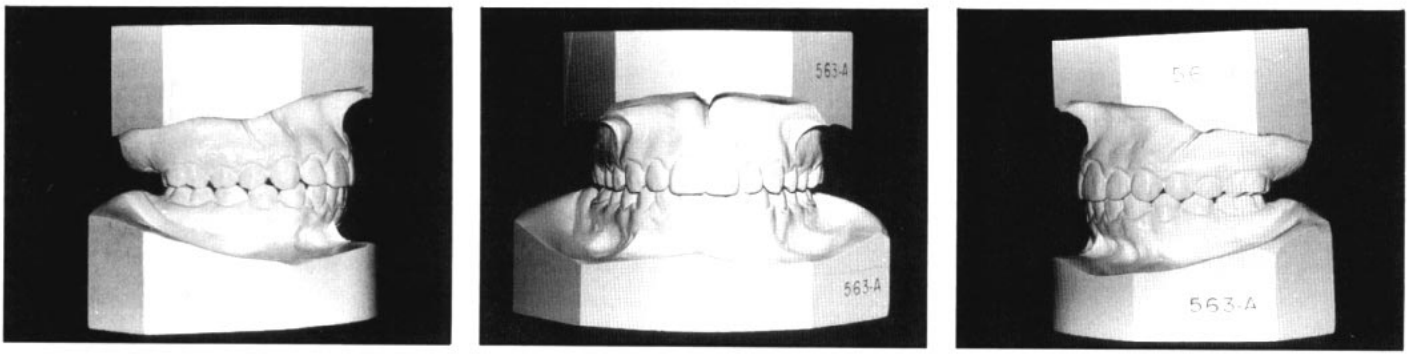


Figure 7
Posttreatment study casts. Net intermolar gain in width is 11.2 mm.

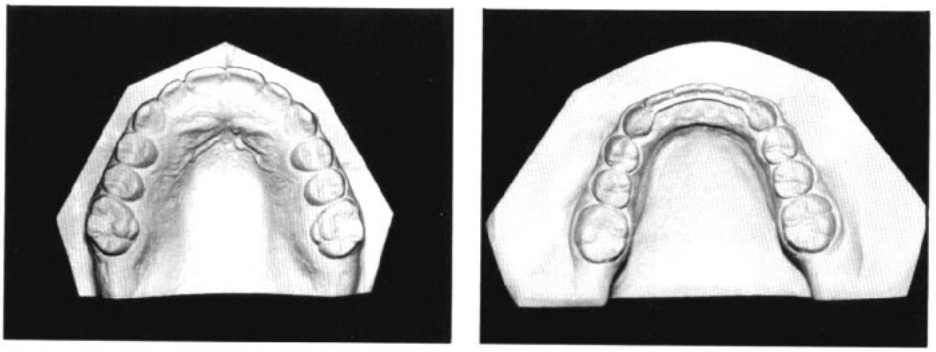


Figure 8
Posttreatment panoramic radiograph. All second molars have been extracted.

Figure 9
Posttreatment headfilm at 14 years 7 months.

tical-pull chin cup for 10 months until eruption was complete.

The final treatment stage, with full Edgewise appliances (.022 x .028) was completed in 19 months. Occipital headgear, attached to the maxillary first molars, was used in conjunction with an upper transpalatal arch and continuous arch mechanics to increase intrusive forces to the posteriors and intrude the maxillary incisors. Second molars were extracted because the excessive lower facial height contraindicated premolar extraction, which could have resulted in a tall, flat profile. Second molar extractions permitted lower arch alignment with minimal incisor retraction.

The patient's tongue thrust problem continued after the openbite was closed so tongue spurs were soldered to the lingual arch of the full appliance.[6] A unilateral right side Class II elastic was used to gain compensatory tooth movement because of the mandibular asymmetry. The vertical-pull chin cup[7] helped minimize the extrusive effect on the mandibular terminal tooth. The patient was referred to an otolaryngologist for an airway evaluation because of her mouth breathing. She was found to have allergies that responded to medication.

Retention consisted of a bonded mandibular cuspid-to-cuspid retainer, a removable maxillary buccal wrap-around retainer with a hole to act as a proprioceptive reminder for the tongue, a removable mandibular acrylic retainer, and continuation of the vertical-pull chin cup on a nightly basis.

Figure 10
Posttreatment photographs at 14 years 7 months

Results

Final facial photographs show a pleasing profile and smile with facial symmetry. Dental midlines are nearly coincident with each other and with the facial midline. Maxillary width is normal and the crossbite and openbite have been corrected. Lower facial height did not increase at the normal rate of 1 to 2 mm per year[8,9] and, in fact, was maintained at the 8-year 7-month measurement. The patient's interlabial gap currently measures 7 mm, or approximately 4 mm more than Burstone's ideal[10] and her parents are considering a vertical reduction genioplasty.

Final evaluation

The important factors in this borderline orthognathic case were: control of forces to avoid extrusion; patient cooperation; and habit control. Class II relationships were corrected through vertical management of dental and skeletal units. Dentoalveolar changes to correct a 10 mm overjet would have seriously aggravated her esthetically-compromised maxillary incisor position, created stability problems and made orthodontic correction virtually impossible. For these reasons, all force systems were designed to elicit an anteroposterior change through intrusive vertical treatment mechanics. When the mandibular third molars erupt it may be necessary to upright them orthodontically. The final study casts were taken 13 months after band removal and the prognosis for future stability, with prolonged retention, appears to be good.

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References

1. Harvold, E.: Morphogenetic response to activator treatment. Am. J. Orthod., 60:478-490, 1971.
2. Harvold, E.: The role of function in the etiology and treatment of malocclusion. Am. J. Orthod., 51:883-898, 1968.
3. Harvold, E.: The activator in interceptive orthodontics. C.V. Mosby Co., St. Louis, MO, 1974.
4. Pearson, L.E.: Vertical control in treatment of patients having backward rotational growth tendencies. Angle Orthod., 43:132-140, 1978.
5. Sandstrom, R.A., Klapper, L., Papaconstantinou: Expansion of the lower arch concurrent with rapid maxillary expansion. Am. J. Orthod., 94: 296-301, 1988.
6. Huang, G., Kennedy, D.B.: Stability of anterior openbite treated with crib therapy. Angle Orthod., 60:17-26, 1990.
7. Pearson, L.E.: Vertical control in fully banded orthodontic treatment. Angle Orthod., 56:205-224, 1986.
8. McNamara, J.A. Jr.: Components of Class II malocclusion in children 8-10 years of age. Angle Orthod., 51:177, 1981.
9. Popowich, F., Thompson, G.W.: Craniofacial templates for orthodontic case analysis. Am. J. Orthod., 71:406, 1977.
10. De Smit, A., Dermaut, L.: Soft tissue profile preference. Am. J. Orthod., 86:67-73, 1984.
11. Burstone, C.J.: Lip posture and its significance in treatment planning. Am. J. Orthod., 53:262-284, 1967.