Case Report

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History

This patient was first presented for treatment at the age of 11 years and 3 months. He had a typical, although severe, Class II, Division 1 malocclusion. Along with this condition he had a recessive mandible and hypotonic oral musculature. His oral health was good. His dentition was in the latter stages of the mixed period and it was decided that treatment should be postponed until the eruption of the permanent cuspids and bicuspids.

On re-examination his age was 12 years and 3 months; the permanent teeth in the buccal segments had erupted including the maxillary second molars. The decision was made to start active treatment at this time. His general physical development was average for his age. He appeared to be a quiet, industrious boy leading one to estimate that cooperation would be excellent.

Diagnosis

A study of the patient and his models demonstrated a severe Class II molar relationship with a pronounced overjet and overbite (Fig. 1). The mandibular buccal segments had a definite mesioaxial inclination starting in the first molar regions and continuing forward to the cuspid regions. The mandibular anterior segment had an excessive amount of labial inclination with slight spacing between the incisors and moderate spacing distal to the cuspids. The curve of spee was not excessive. A midline deviation of two millimeters was present.

No tongue pressures during swallowing or speech could be detected and it was reasoned that the labial inclination of the mandibular incisors was functional in cause. A study of his facial photographs brought again into focus the recessive mandibular position and hypotonic lip structure.

Cephalometric films substantiated the above clinical findings (Fig. 2). Using the Steiner analysis, the anterior segments of the denture were forward of the normal range limits for anteroposterior positioning. The maxillary incisors were 9 millimeters forward of and at 34 degrees to the NA line. The mandibular incisors were 6 millimeters forward of and at 28 degrees to the NB line. The recessive appearance of the lower third of his face was demonstrated by an SNA reading of 75 degrees and by an SNB angle of 70.5 degrees.

Findings on the positive side of the ledger were the favorable Y axis as measured to the nasion-basion line of +6.5 degrees, and a mandibular plane angle in relation to SN of 32.5 degrees. A study of mandibular dimensions utilizing the template devised by Wylie and Johnson demonstrated that mandibular size fell within one standard deviation of the limits that denote a "good" mandible both in ramus height and body length. The gonial angle also conformed closely to the template's mean for well-shaped gonial angles. A further notation of specific components of the mandible using Rickett's criteria demonstrated a moderately wide ramus and a well-formed symphysis with pogonion 3 millimeters anterior to point B.

The mandibular left second molar was unerupted and intraoral x-rays showed that the crown was inclined lingually to a degree severe enough to

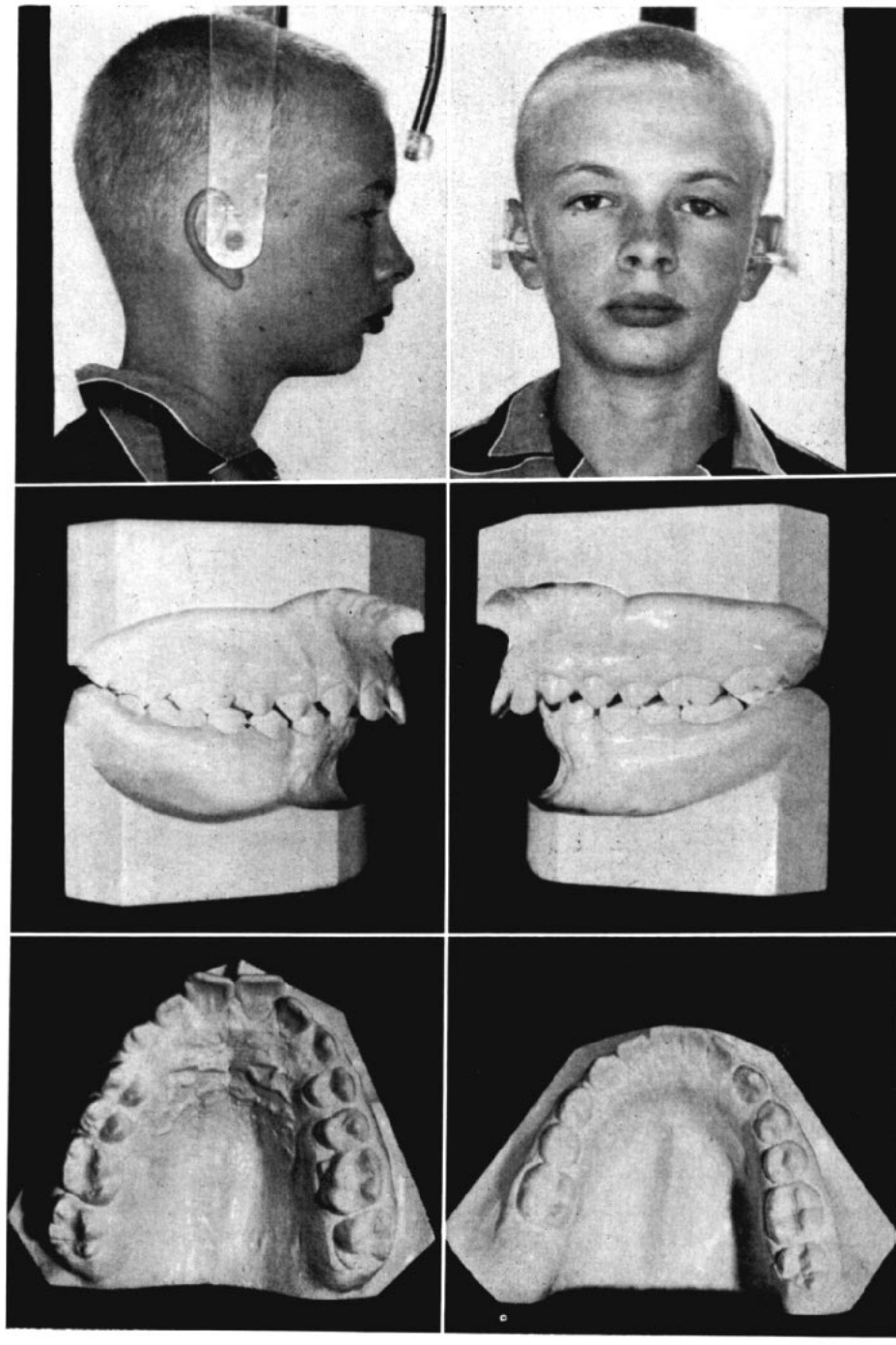

Fig. 1

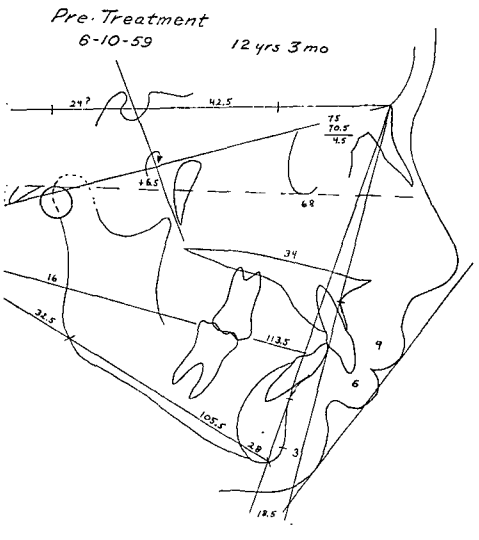

Fig. 2

prevent normal eruption. All teeth were found to be normal in root structure.

Plan of Treatment

The plan of treatment was determined by a systematic weighing of all evidence the assembled records and the patient afforded. Of prime importance was an evaluation of the overall facial response during the treatment period. In spite of the vagaries of growth during orthodontic treatment, an attempt at visualizing a growth pattern should be made to give temporary peace of mind to the orthodontist during the treatment planning phase of the case.

Gross examination of the cephalometric film revealed that the mandible appeared immature in proportion to the total skeletofacial complex. A latent growth potential seemed likely. Adding weight to this premise was the finding that overall mandibular form was good with both symphysis and ramus possessing definite qualities of width. Further, the patient's father and mother had pronounced development in ramus height with a squareness to the gonial angle area. All things considered, chances were that this boy would have a definite increase in mandibular size.

The mandibular arch, although protrusive, appeared to be responsive to a nonextraction treatment plan. A correct application of forces on the buccal segments and the mandibular incisors would allow them to be repositioned distally and lingually in more ideal locations both in relation to the dental profile and the supporting bone structure. The forward inclinations of the buccal segments and the spacing distal to the mandibular cuspids were prime factors in leading to this decision.

The favorable finding of the Y axis in relation to the nasion-basion line was one hint that the vector of mandibular growth would be in a direction to assist treatment. Using Rickett's method of cephalometric synthesis and projecting the mandible bodily along the Y axis, an attempt was made to visualize the response that would occur with cervical headgear therapy and Class III intraoral elastic force to upright the mandibular buccal and anterior segments. It was decided that this general plan of treatment would be feasible.

An edgewise appliance utilizing .022 × .028 brackets was placed. All maxillary teeth were banded, and tubes were placed on the maxillary second molar bands for cervical traction. The mandibular arch was banded entirely from first molar to first molar. Treatment was initiated by placing a cervical headgear to the maxillary arch while a series of leveling wires was placed in both arches. Following leveling, an upper .021 × .027 stabilizing wire was placed. Class III elastics were applied to hooks soldered mesial to the cuspids on an .018 lower archwire. This mandibular wire was gradually replaced by an .020 round and then followed by a .019 × .026 wire. Tip-back bends were placed in all wires. During this period the mandibular buccal segments were up-

righted and the spaces were closed in the maxillary and mandibular incisal segments.

A .021 × .027 stabilizing mandibular archwire was placed and Class II elastic force was applied to hooks soldered mesial to the cuspids on a maxillary .020 × .026 archwire. Moderate tip-back bends were incorporated in both upper and lower archwires. Cervical traction was continued to the maxillary arch during the correction of the Class II relationship. The proper degree of torque for the anterior segments of the rectangular archwires was maintained at all times.

Toward the final phase of the Class II correction, the mandibular left second molar was surgically exposed and subsequently banded. The mandibular left third molar was removed at this time to allow the second molar to be mechanically uprighted.

The uprighting and aligning of this tooth was accomplished during the finishing stage of treatment. Coordinated .021 × .025 upper and lower archwires were used with cross elastics placed from the maxillary arch to the lingual of the mandibular left second molar.

The correction of the midline deviation was also accomplished during the finishing period of treatment. Class II elastics were used on the right buccal segment and an anterior cross elastic was placed from the maxillary left cuspid region to the mandibular right cuspid region.

Progress of the Case

The patient was under active treatment for 23 months. His response to the Class II correction phase was remarkably rapid, occurring in a 14 month period from the start of treatment. The final 9 months of treatment involved refinement and coordination of both arches and included the uprighting of the mandibular left second molar and correction of the midline deviation. His cooperation was excellent during all phases of treatment.

Retention

A positioner was worn faithfully for a period of one month and then discontinued. Maxillary and mandibular Hawley retainers were then placed and worn continually for a period of one year. Thereafter, they were worn nights only for another year. A slight bite plane was incorporated in the upper retainer.

Results Achieved

Cephalometric films demonstrated the following changes (Fig. 3). The maxillary incisors are now 4.5 millimeters at 22.5 degrees to the NA line and the mandibular incisors 4.5 millimeters at 23 degrees to the NB line. The SNA angle was reduced from 75 to 73.5 degrees, and the ANB angle has decreased from 4.5 to 2 degrees.

The Y axis reading to the nasion-basion plane is now +7 degrees, and the mandibular plane to SN decreased

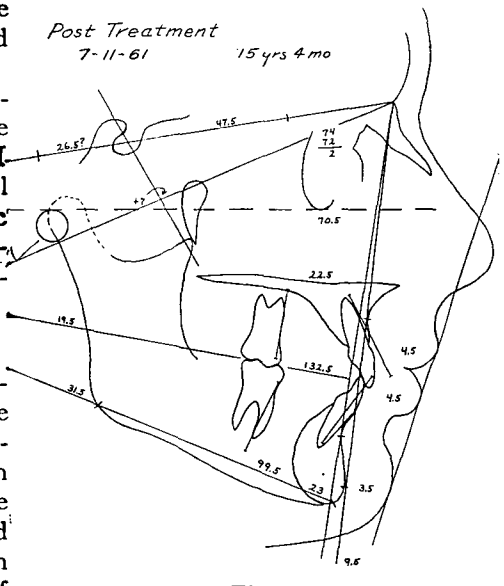

Fig. 3

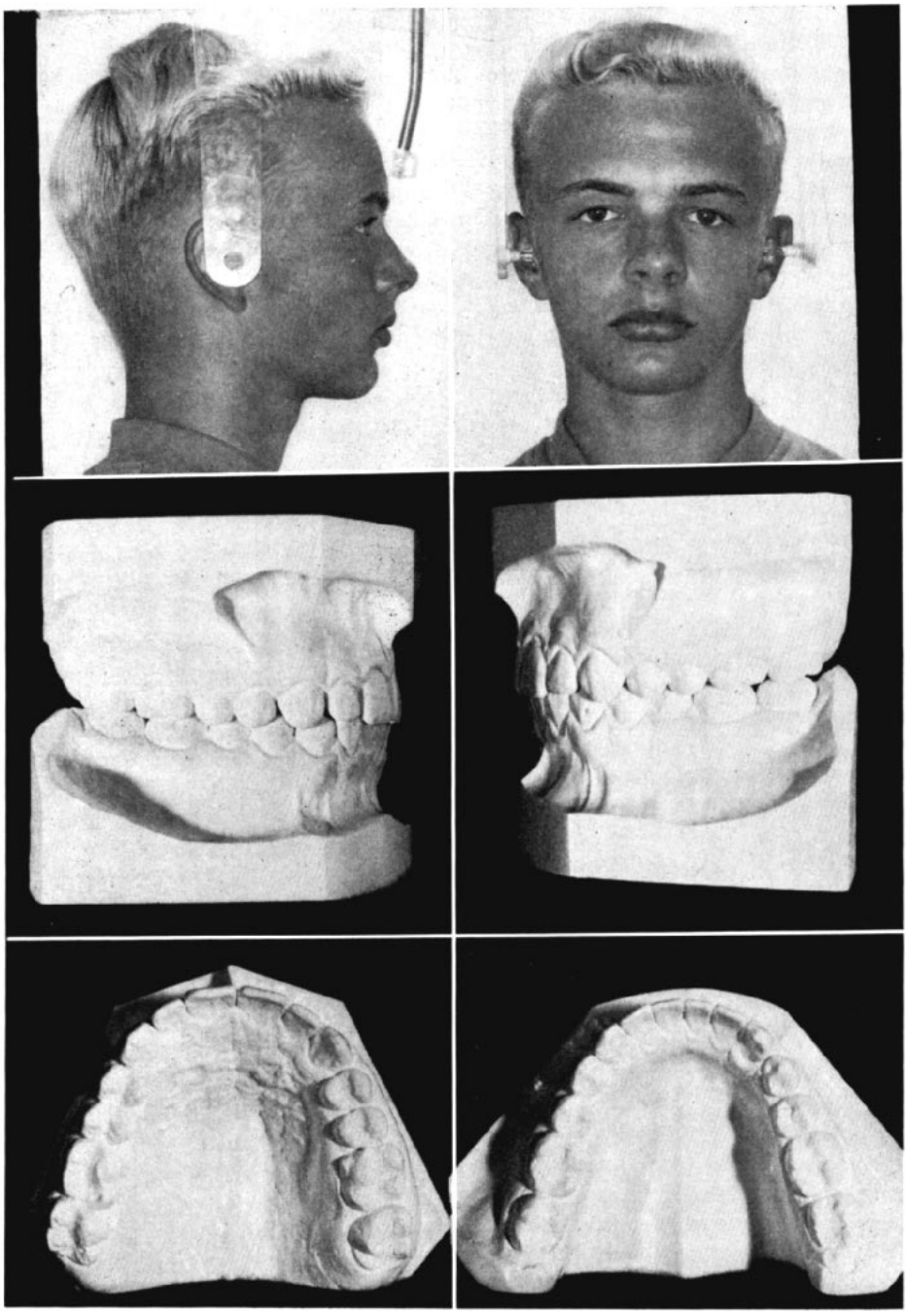

Fig. 4

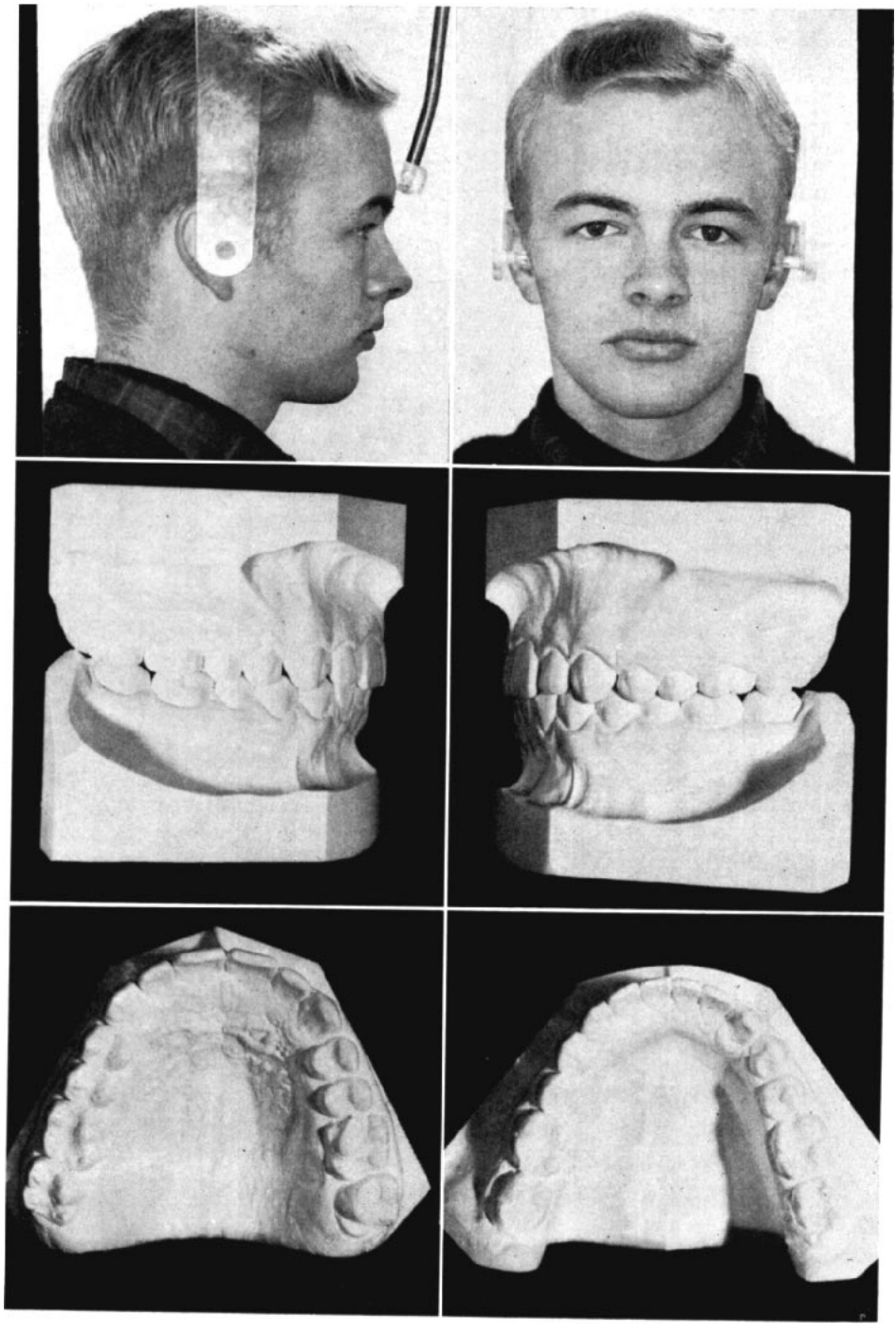

Fig. 5

from 32.5 to 31.5 degrees, both of which indicate a favorable growth response during treatment.

Intraoral x-rays demonstrated that all roots and their supporting structures remained healthy.

A photographic analysis at the end of treatment demonstrated a marked improvement in profile and front views with a harmonious lip, nose and chin relationship (Fig. 4).

Models taken during the retention period demonstrated a correction of the Class II relationship and anterior overbite and overjet.

Observations and Conclusions

In evaluating cephalometrically the facial changes during active treatment, three very meaningful observations can be made. The first is the large amount of mandibular growth during treatment. The second is when this happened; his growth spurt occurred almost exactly during the time of active treatment. These two factors greatly assisted the treatment and were largely responsible for its success. However, they were expected and were utilized to the utmost in treatment planning and execution.

A third observation is of interest. The time period in which this boy's treatment was carried out was certainly the optimum one. Had headgear treatment been started in the mixed dentition period, it is very probable that the correction would have required a greatly increased time period and the end facial result might have been less favorable.

Posttreatment Findings

Two and one-half years after the appliances were removed, complete records were taken again. The patient was 18 years, 1 month of age at this time and all retentive devices had been discontinued for one year.

Front and side view photographs denote only a slight change from the photographs taken at the end of active treatment; these changes appear to be maturational in nature. The profile and front view characteristics are still pleasing (Fig. 5).

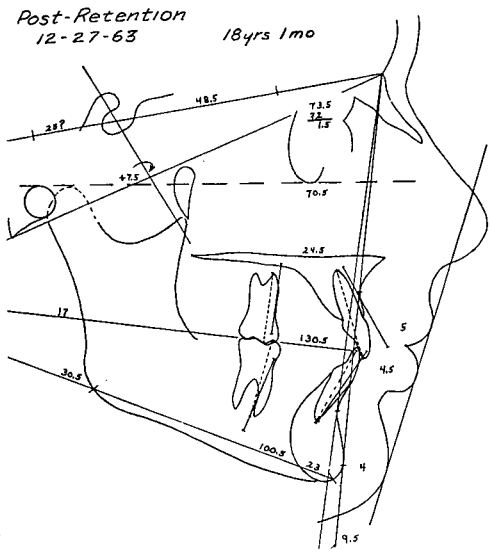

Fig. 6

A study of the posttreatment models shows stability in the corrected molar relationship, a maintenance of a correct overbite and overjet relationship of the anterior segments, and arch forms that have remained stable.

The cephalometric film demonstrated only the slightest change from those taken during the retention period (Fig. 6). These subtle changes verify the photographic evidence that this boy's facial growth was essentially complete at the end of active treatment. A study of the relative positions of the incisors and molars to their positions at the end of active treatment indicates a favorable readjustment and stability during the postretention period.

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