American Institute for Bioprogressive Education

ORTHODONTIC TREATMENT IN THE GROWING PATIENT

VOLUME 4 - MECHANICS

Robert M. Ricketts D.D.S., M.S.

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Scottsdale, Arizona

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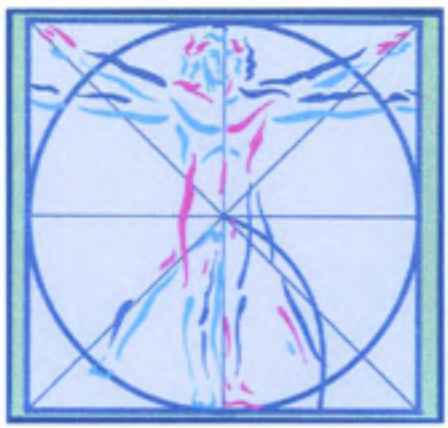

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VOLUME IV

MECHANICS FOR DECIDUOUS AND MIXED DENTITIONS – ORTHODONTIC AND ORTHOPEDIC TREATMENT

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VI. SUMMARY

LECTURE ELEVEN – CLASSIC PROBLEMS TREATED IN THE MIXED DENTITION

I. INTRODUCTION

Problems in orthodontics are compounded at the time of development of the mixed dentition. If an overjet is present, the relationship mostly worsens. Also, arch length shortages in the lower become more manifested. A problem then is the management of the permanent incisors when the permanent canines are not yet erupted, or canines in positions endangering the roots of the permanent lateral incisors. Thus, special problems commonly exist regarding maxillary incisors, intrusion and torque in mixed dentition children. Patients of Class II Div. 1 were cited in the previous lecture (Cases # 8 and 9). Class II Div. 2 cases in the mixed dentition are the next subject. Division 2, by definition, **has contact of the incisors associated deep bite.**

In severe Class I a mild cross bite is prevalent but often not noticed until revealed by the frontal analysis. Arch length problems become evident in the mixed dentition in both arches. The transverse dimension therefore comes into great concern. Further, the problem of anchorage and facial types become so variable that a **combination of different modalities** is indicated. Progressive thinking is involved in all three major types of malocclusion. Problems often involve a deviation of the mandible that may not be obvious at first inspection. For that reason, Ricketts has routinely taken joint x-rays in all patients as a part of the diagnosis and monitoring procedure.

A part of the dilemma of al early treatment consists of the choice of extraction and its effects on the ultimate mature face. From the 1940's through the 1960's, soma. extraction, to some clinicians, was the only choice for arch length shortage as discussed in Lecture Seven – *Modalities employed for the Juvenile Patient*. Patients of this kind need discussion and different possibilities

are sited. Extraction of deciduous canines does not mean automatic extraction of premolars.

Four more groups of patients were selected to demonstrate certain types of problems and to show the results with specific therapeutic regimes together with results in long term.

The student is to be reminded that single patients are anecdotal. Some of the patients demonstrated were quite controversial and therefore make good teaching cases to show possibility and arouse controversy. Please keep in mind that some of these patients were treated almost fifty years ago and many before long range forecasting was developed.

II. CLASS II DIV 2 PATIENTS WITH EXTRAORAL TRACTION - *Group Five*

Case #10 S.M.: Severely Developing Deep Bite (Fig. 11-10 series)

The patient presented at age 8.10 years with closed-bite and the probability of increasing anterior incisor impingement. Also an asymmetry was noted. The decision was reached, with the help of a VTO, to employ a medium tension head gear in order to clear the space for the upper canines and later to torque and intrude the upper incisors. The lower arch was not crowded and immediate attention was directed to the upper arch.

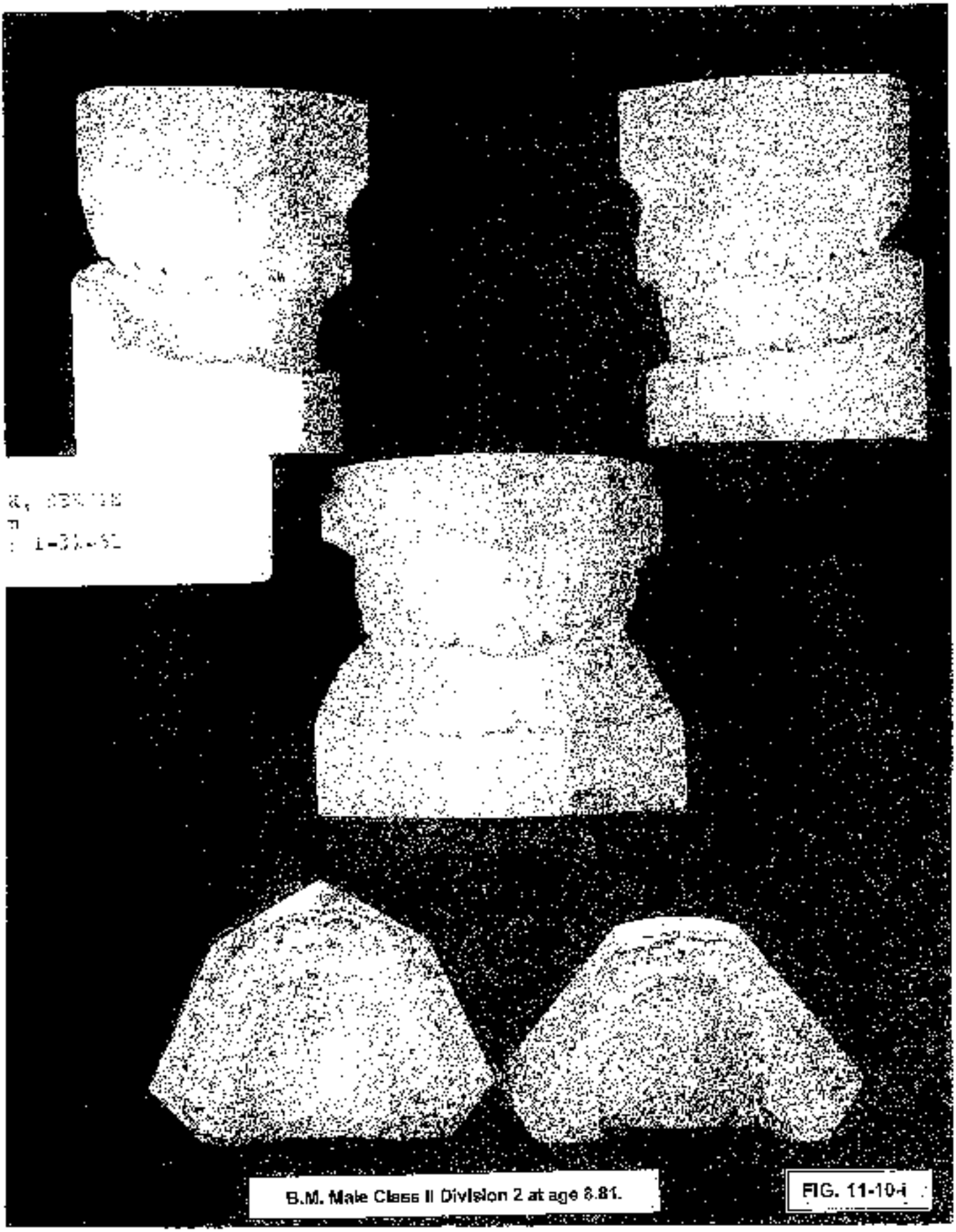
Treatment

Step 1. Cervical traction was applied to the upper first permanent molars for 9 months. Step 2, the incisors were banded with .018" torque brackets (22° and 17°). A continuous .016" x .016" blue Elgiloy arch wire was spanned from the molar. Intrusion and torque on the incisor tipped the molar backward but accomplished a change of 20 degrees in the angulation of the central incisors.

The condition was treated to an end to end bite and was retained. **No other treatment was employed through the transition to the permanent dentition.**

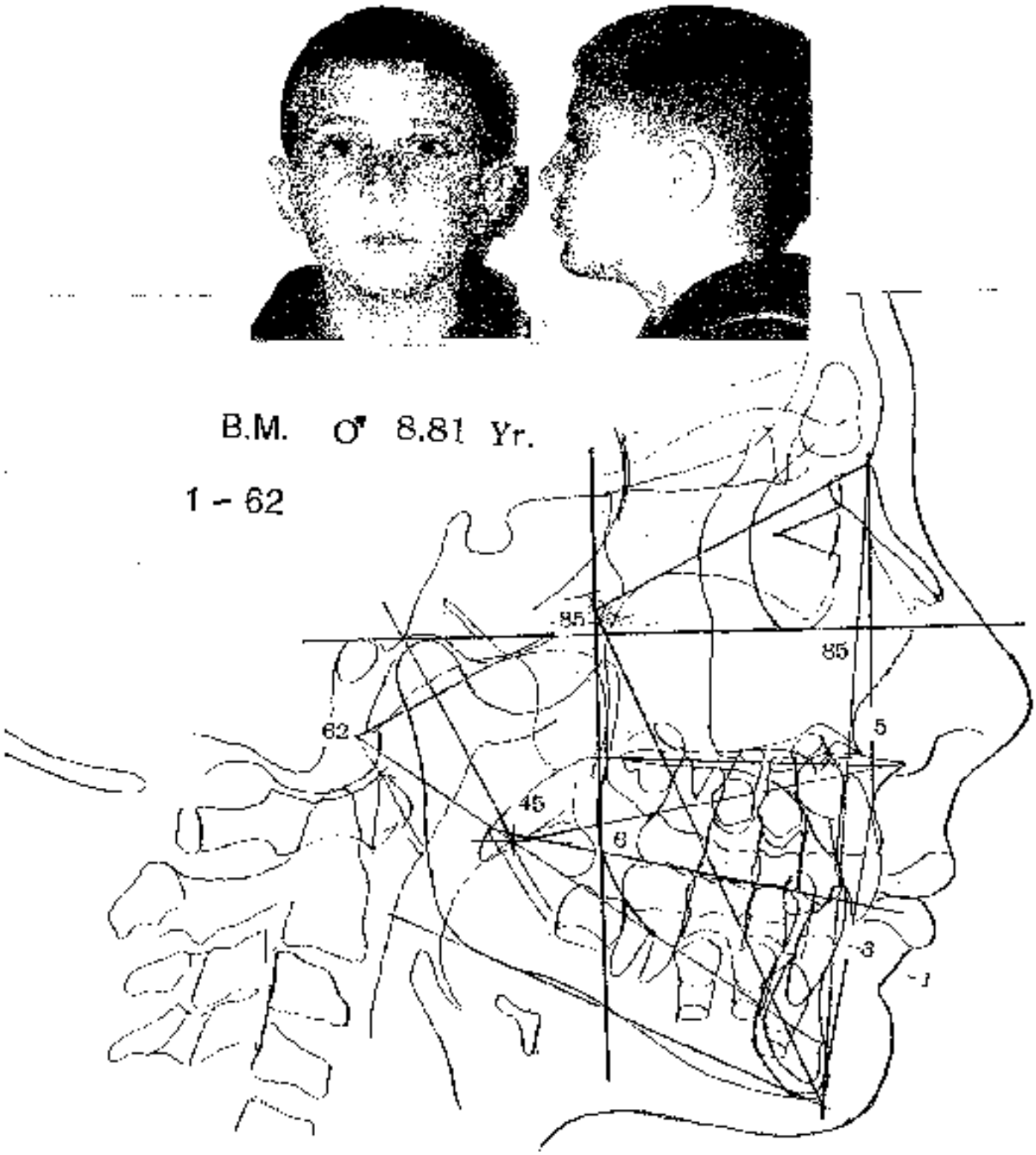
Full appliances were placed for finishing. The **tooth mass** worked out to an end to end relation which stayed remarkably stable.

The face and smile were of "Greek ideal" proportions. The upper second molars having been once quite crowded erupted and drifted into place following good mandibular growth (as forecasted).



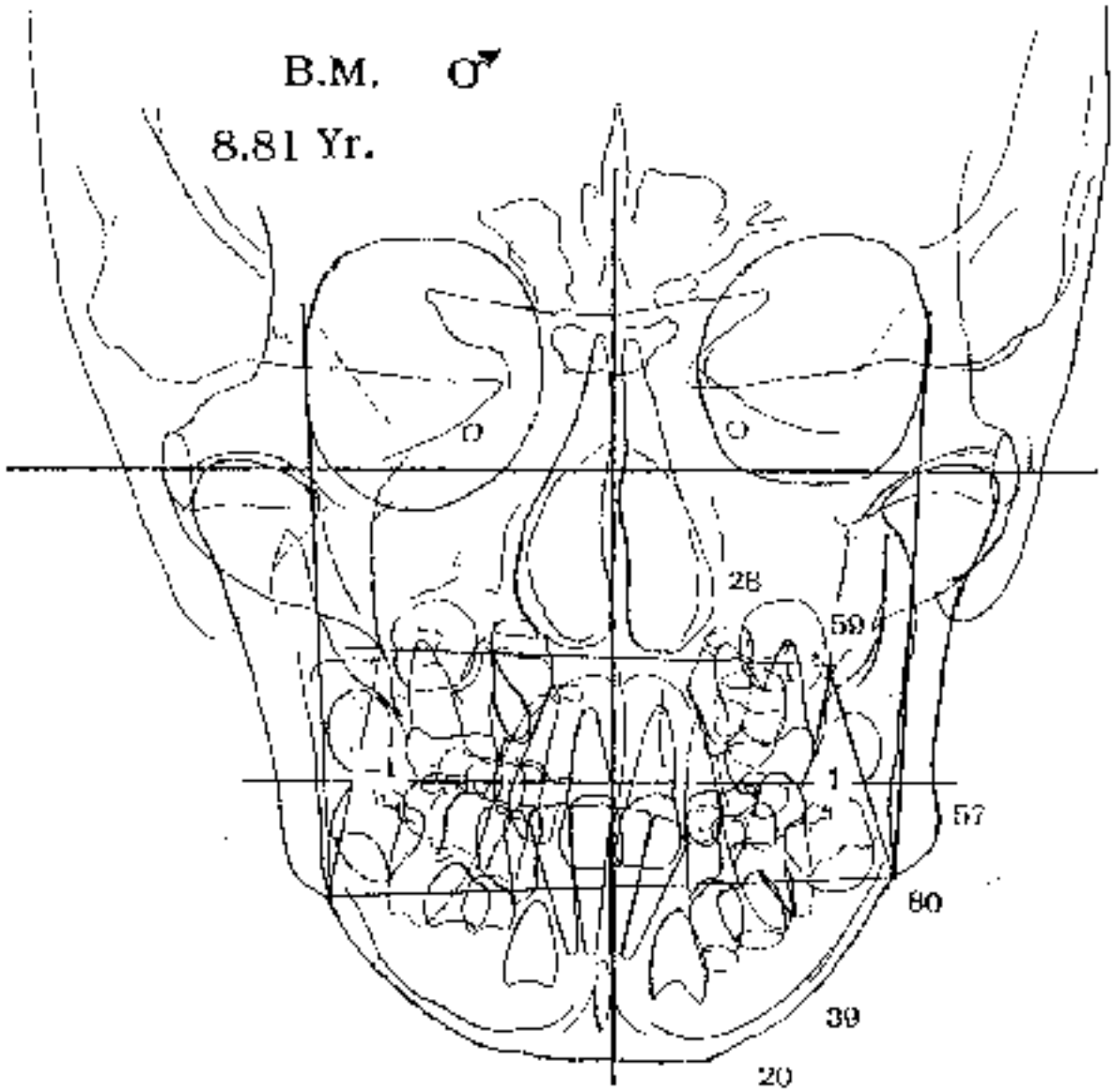
B.M. Male Class II Division 2 at age 8.81.

FIG. 11-10-i



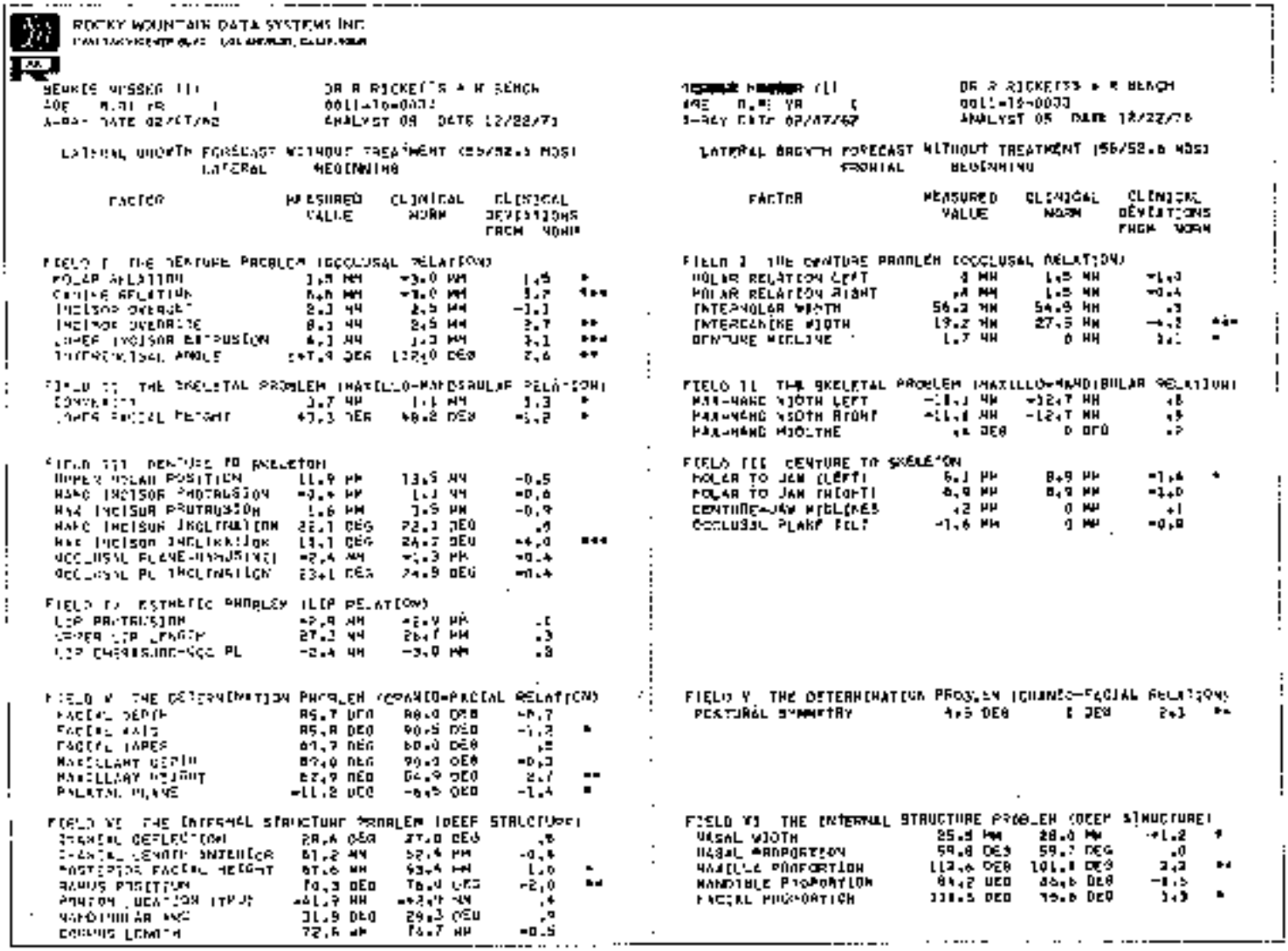
Photographs and lateral abstract analysis on B.M. Note convexity and Facial Axis (85°)

FIG. 11-10-II



Frontal Analysis on B.M. shows asymmetry in molar occlusion. Both sides were Class II. Lower canines were narrow.

FIG. 11-10-iii



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LATERAL GROWTH FORECAST WITHOUT TREATMENT (56/52.6 YRS)
LATERAL BEGINNING

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
MOLAR RELATION	1.5 MM	+3.0 MM	-1.5	*
CANINE RELATION	6.8 MM	+8.0 MM	-1.2	***
INCISOR OVERJET	2.1 MM	2.5 MM	-.4	
INCISOR OVERBITE	0.1 MM	2.5 MM	-2.4	**
LOWER INCISOR EXTRUSION	4.1 MM	1.0 MM	+3.1	***
INTERINCISAL ANGLE	147.9 DEG	132.0 DEG	+15.9	***
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
CONVEXITY	3.7 MM	1.1 MM	+2.6	*
JAWS FACIAL HEIGHT	49.3 MM	48.2 DEG	+1.1	*
FIELD III DENTURE TO SKELETON				
UPPER MOLAR POSITION	11.9 MM	13.5 MM	-1.6	
HARD INCISOR PROTRUSION	+0.4 MM	1.1 MM	-0.7	
SOFT INCISOR PROTRUSION	1.6 MM	3.5 MM	-1.9	
HARD INCISOR INCLINATION	22.1 DEG	22.1 DEG	.0	
SOFT INCISOR INCLINATION	13.1 DEG	24.2 DEG	-11.1	***
OCCLUSAL PLANE-MANDIBLE	+2.4 MM	+1.3 MM	+1.1	
OCCLUSAL PL INCLINATION	23.1 DEG	24.9 DEG	-1.8	
FIELD IV AESTHETIC PROBLEM (LIP RELATION)				
LIP PROTRUSION	+2.9 MM	+2.9 MM	.0	
UPPER LIP LENGTH	27.2 MM	26.7 MM	+.5	
LIP CHEEK JUNC-OCC PL	-2.4 MM	-3.0 MM	+.6	
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
FACIAL DEPTH	85.7 DEG	88.0 DEG	-2.3	
FACIAL AXIS	85.8 DEG	90.5 DEG	-4.7	*
FACIAL TAPER	61.7 DEG	68.0 DEG	-6.3	
MAXILLARY DEPTH	89.0 DEG	90.0 DEG	-1.0	
MAXILLARY HEIGHT	52.9 DEG	54.9 DEG	-2.0	**
PALATAL PLANE	-11.2 DEG	-8.5 DEG	-2.7	*
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
GONIAL DEFLECTION	28.4 DEG	27.0 DEG	+1.4	
CRANIAL LENGTH ANTERIOR	51.2 MM	52.4 MM	-1.2	
POSTERIOR FACIAL HEIGHT	87.6 MM	93.4 MM	-5.8	*
RAMUS POSITION	78.3 DEG	78.0 DEG	+0.3	**
PORION LOCATION (TMJ)	-41.9 MM	-42.7 MM	+.8	
MANDIBULAR ARC	31.9 DEG	29.3 DEG	+2.6	
CORPUS LENGTH	72.6 MM	74.7 MM	-2.1	

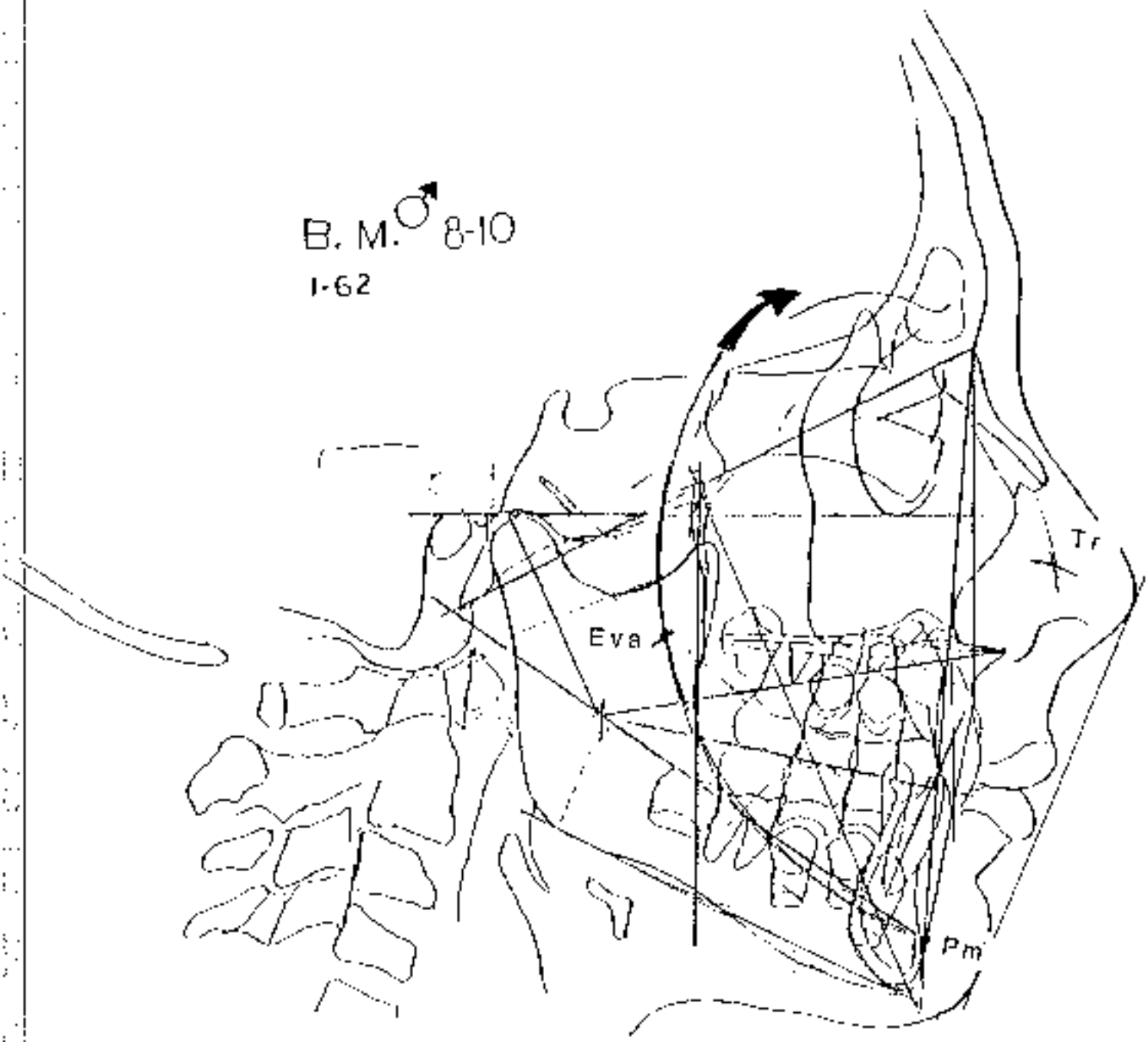
DR R RICKETTS & M BENCH
ANALYST 05 DATE 12/22/76

LATERAL GROWTH FORECAST WITHOUT TREATMENT (56/52.6 YRS)
FRONTAL BEGINNING

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
MOLAR RELATION LEFT	3 MM	1.5 MM	+1.3	
MOLAR RELATION RIGHT	.4 MM	1.5 MM	-1.4	
INTERMOLAR WIDTH	56.2 MM	54.9 MM	+.3	
INTERCANINE WIDTH	19.2 MM	27.5 MM	-4.3	***
DENTURE MIDLINE	1.7 MM	0 MM	1.7	*
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
MAX-MAND WIDTH LEFT	-18.1 MM	+12.7 MM	+6	
MAX-MAND WIDTH RIGHT	-11.1 MM	-12.7 MM	+.9	
MAX-MAND MIDLINE	+.4 DEG	0 DEG	+.7	
FIELD III DENTURE TO SKELETON				
MOLAR TO JAW (LEFT)	6.1 MM	8.9 MM	-1.4	*
MOLAR TO JAW (RIGHT)	6.9 MM	8.9 MM	-1.0	
DENTURE-JAW MIDLINES	.2 MM	0 MM	+1	
OCCLUSAL PLANE TILT	-1.6 MM	0 MM	-0.8	
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
POSTURAL SYMMETRY	4.5 DEG	0 DEG	2.1	**
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
NASAL WIDTH	25.5 MM	28.0 MM	-1.2	*
NASAL PROPORTION	59.8 DEG	59.7 DEG	.0	
MAXILLA PROPORTION	113.6 DEG	101.1 DEG	2.2	**
MANDIBLE PROPORTION	84.2 DEG	85.6 DEG	-1.5	
FACIAL PROPORTION	338.5 DEG	75.6 DEG	1.9	*

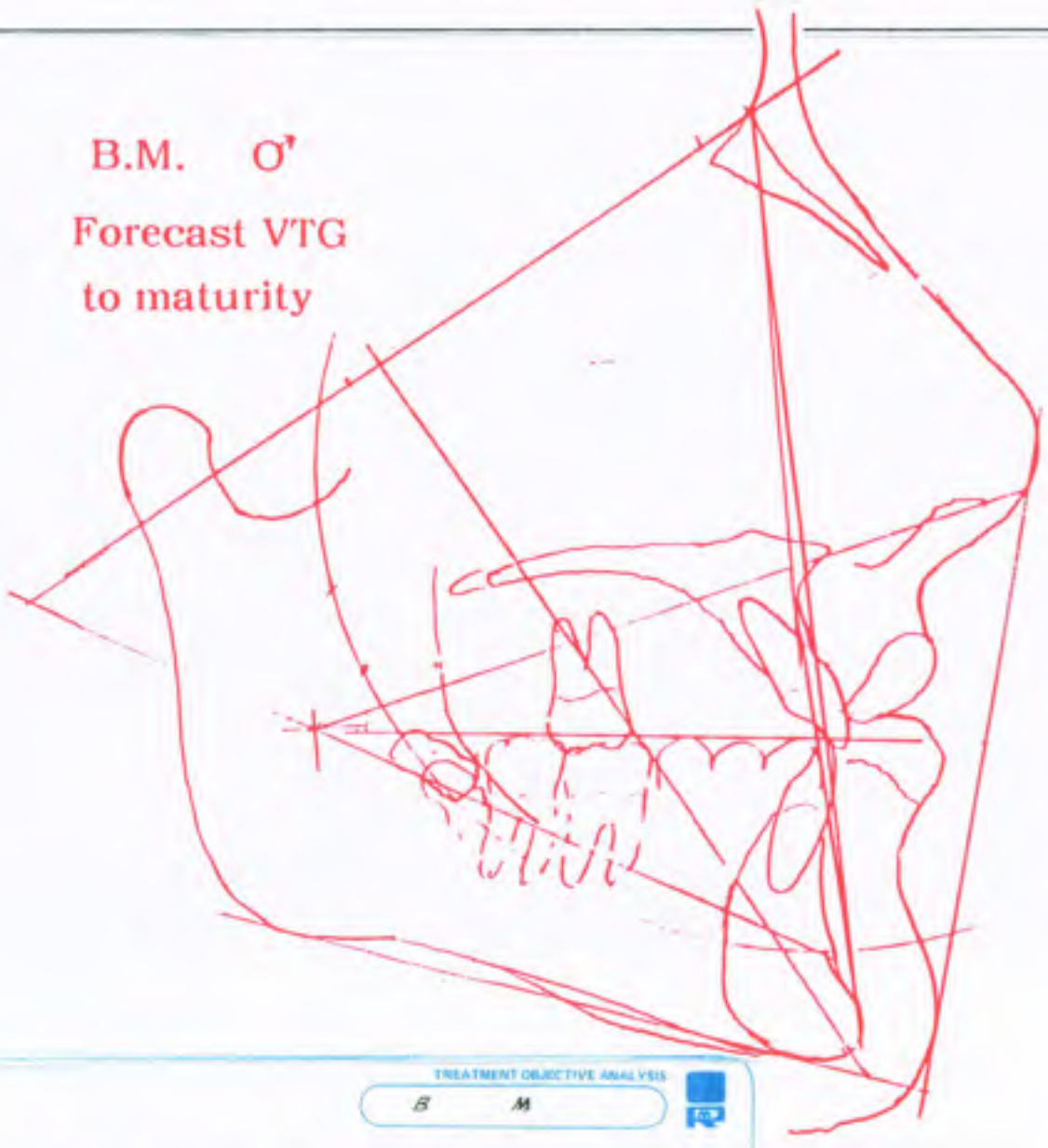
Computer Comprehensive Analysis Printout. Note stars in the denture area and ramus position.

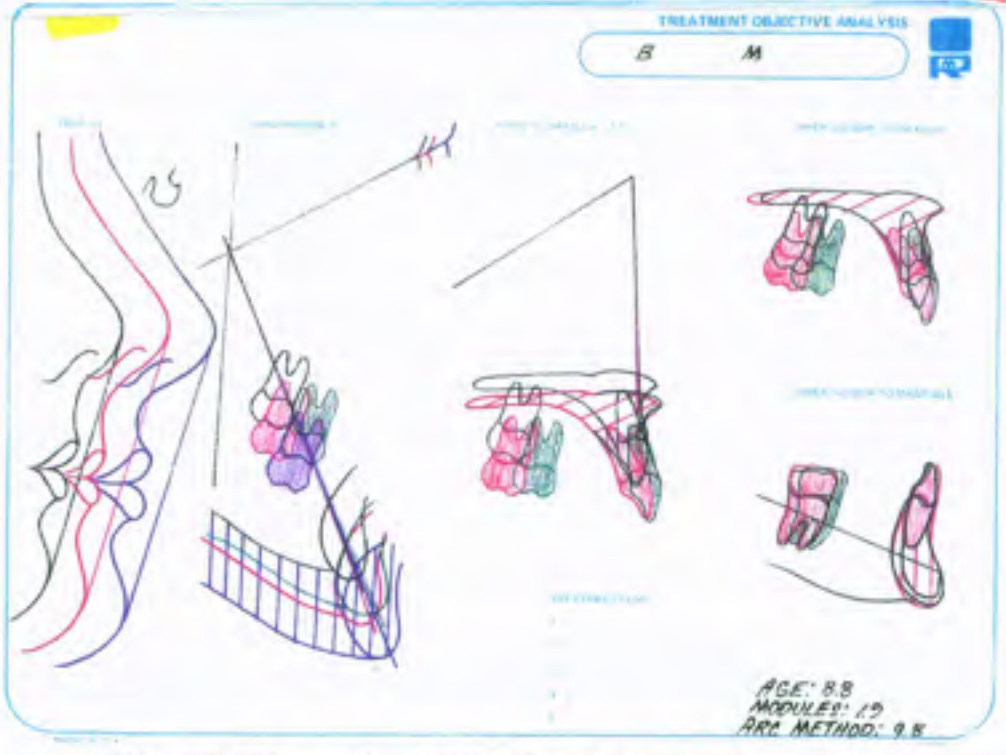
FIG. 11-10-iv



Preparation of the lateral film for forecasting on the arc of the mandible. Tr is True radius at the distance from Pm to Eva.

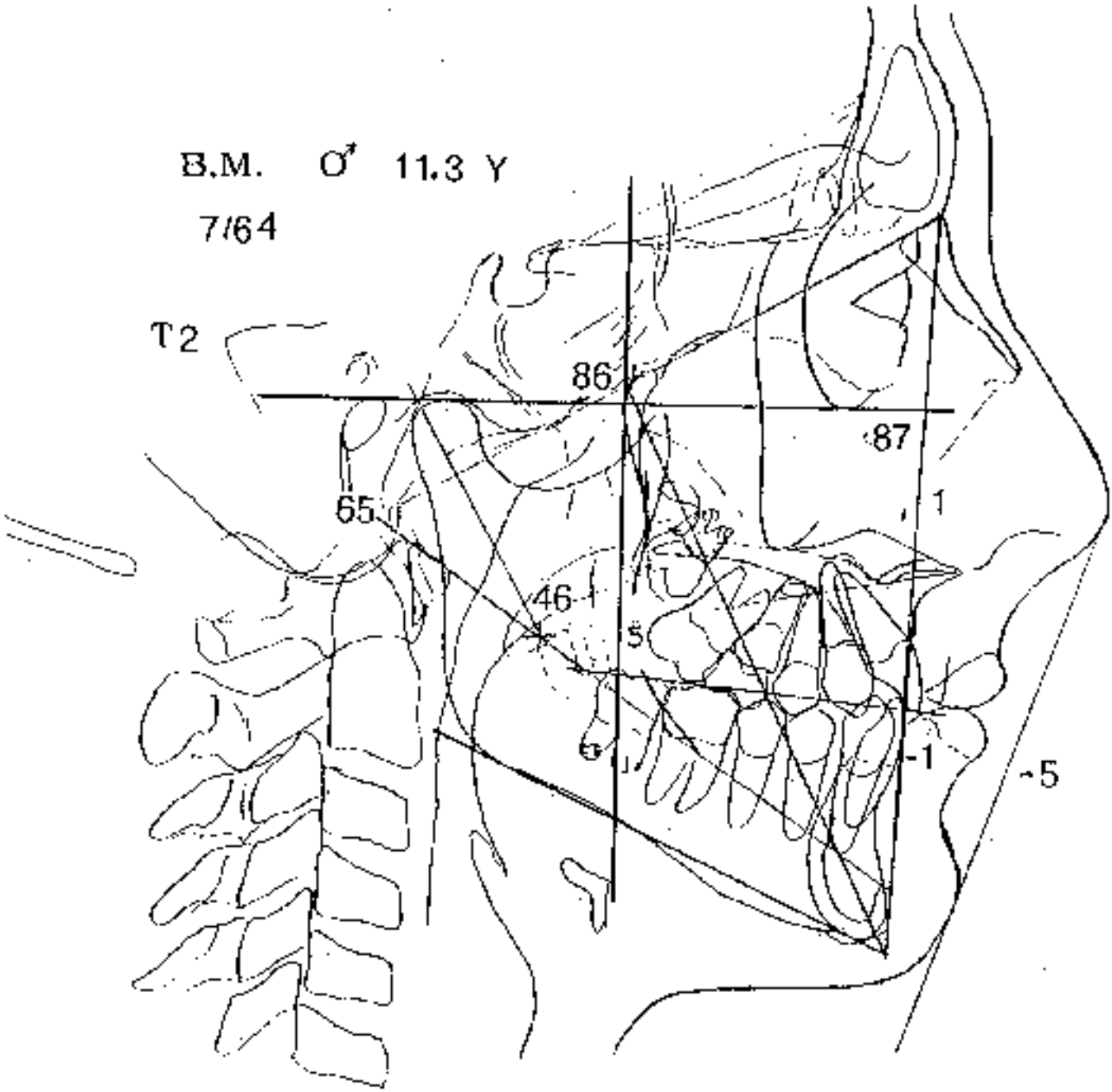
FIG. 11-10-v





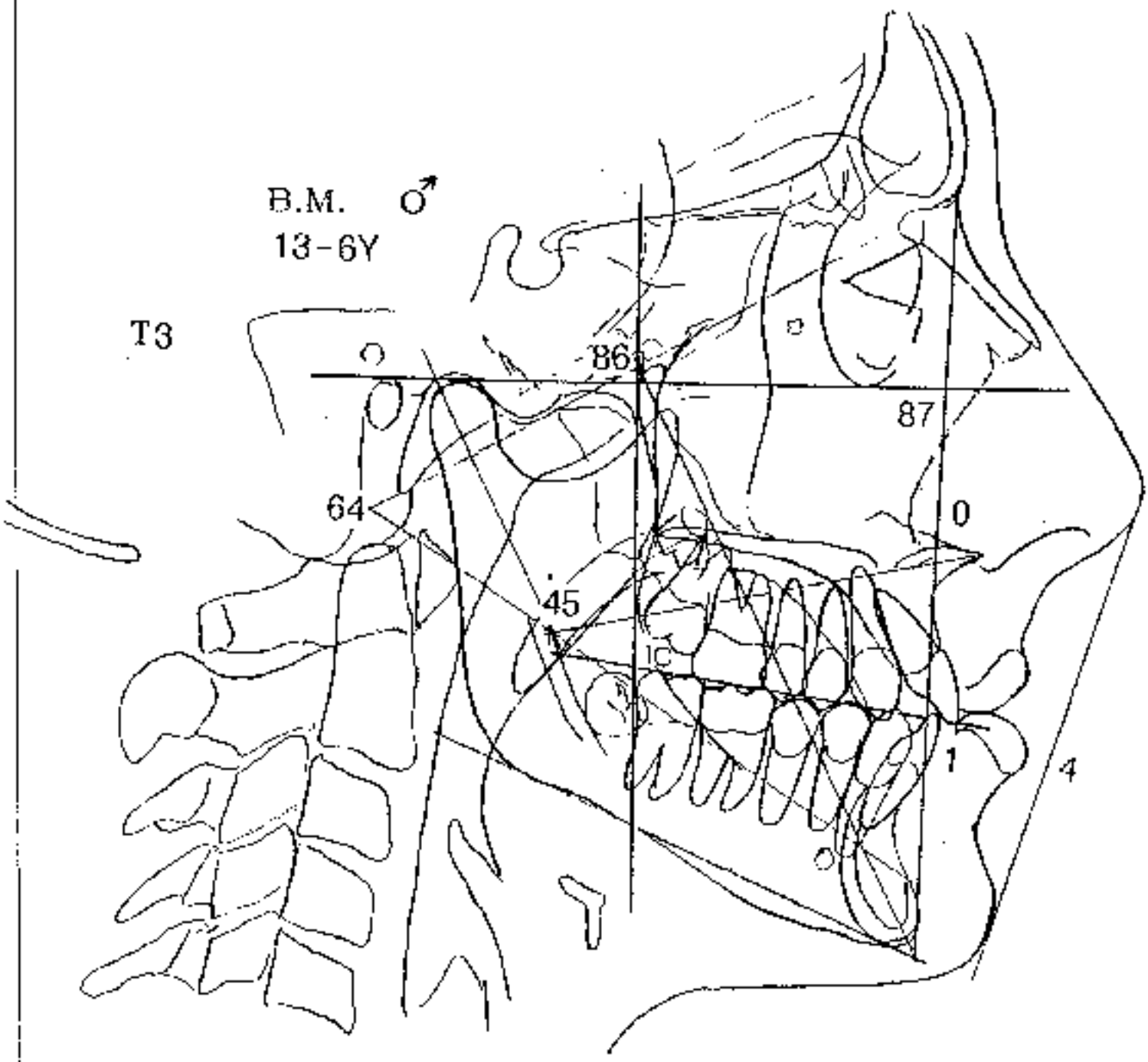
VTG and analysis of the VTO- VTG for B.M. Green is position without treatment, red is short range objective and purple is long range to age 19 years.

FIG. 11-10-vi



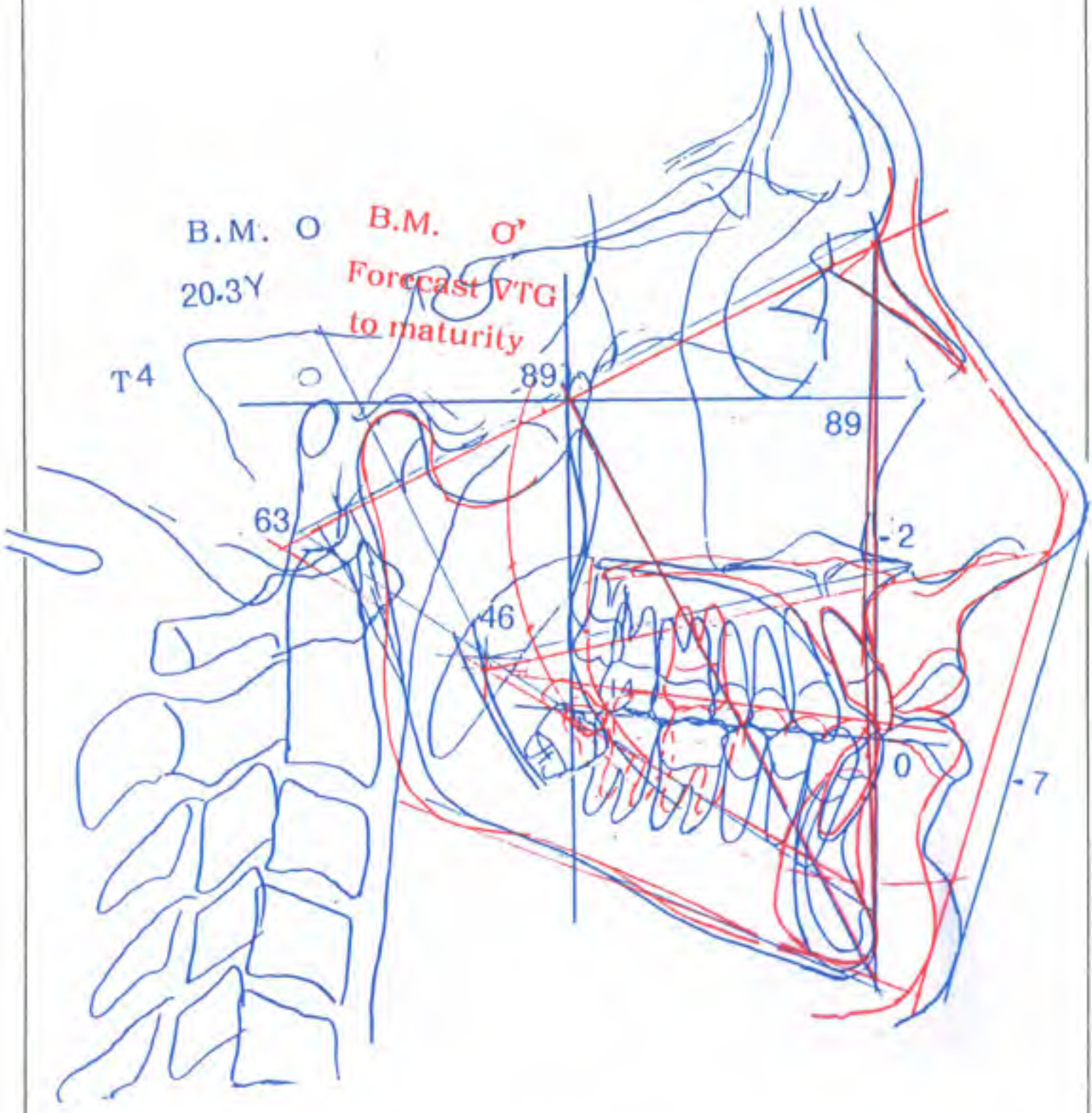
At 11.3 years B.M. was in super Class I, a straight profile and intruded and torqued.

FIG. 11-10-vii



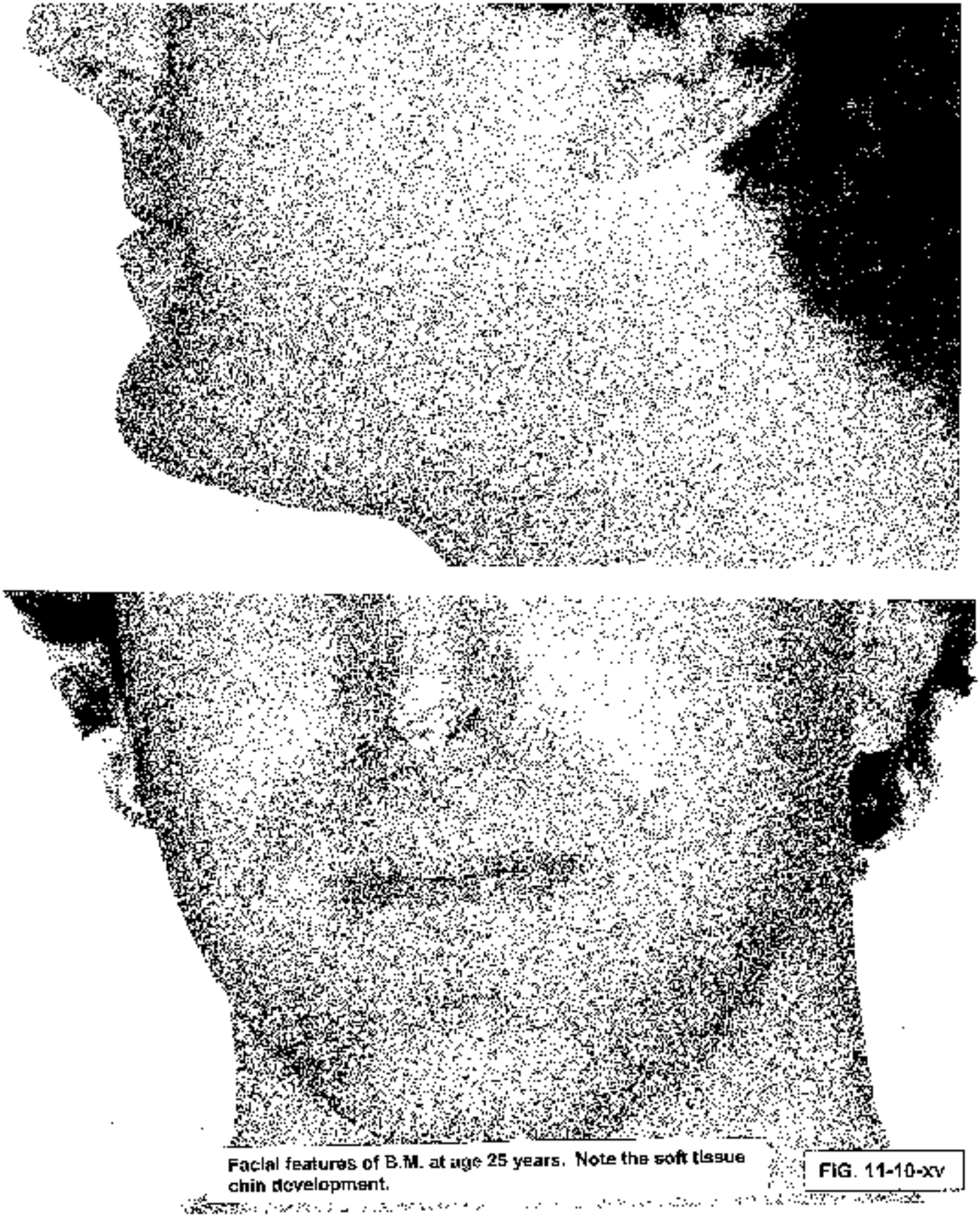
B.M. Two years later at 13.6 upper second molar is delayed by space. The upper first molar crown is distal to the Facial Axis.

FIG. 11-10-viii



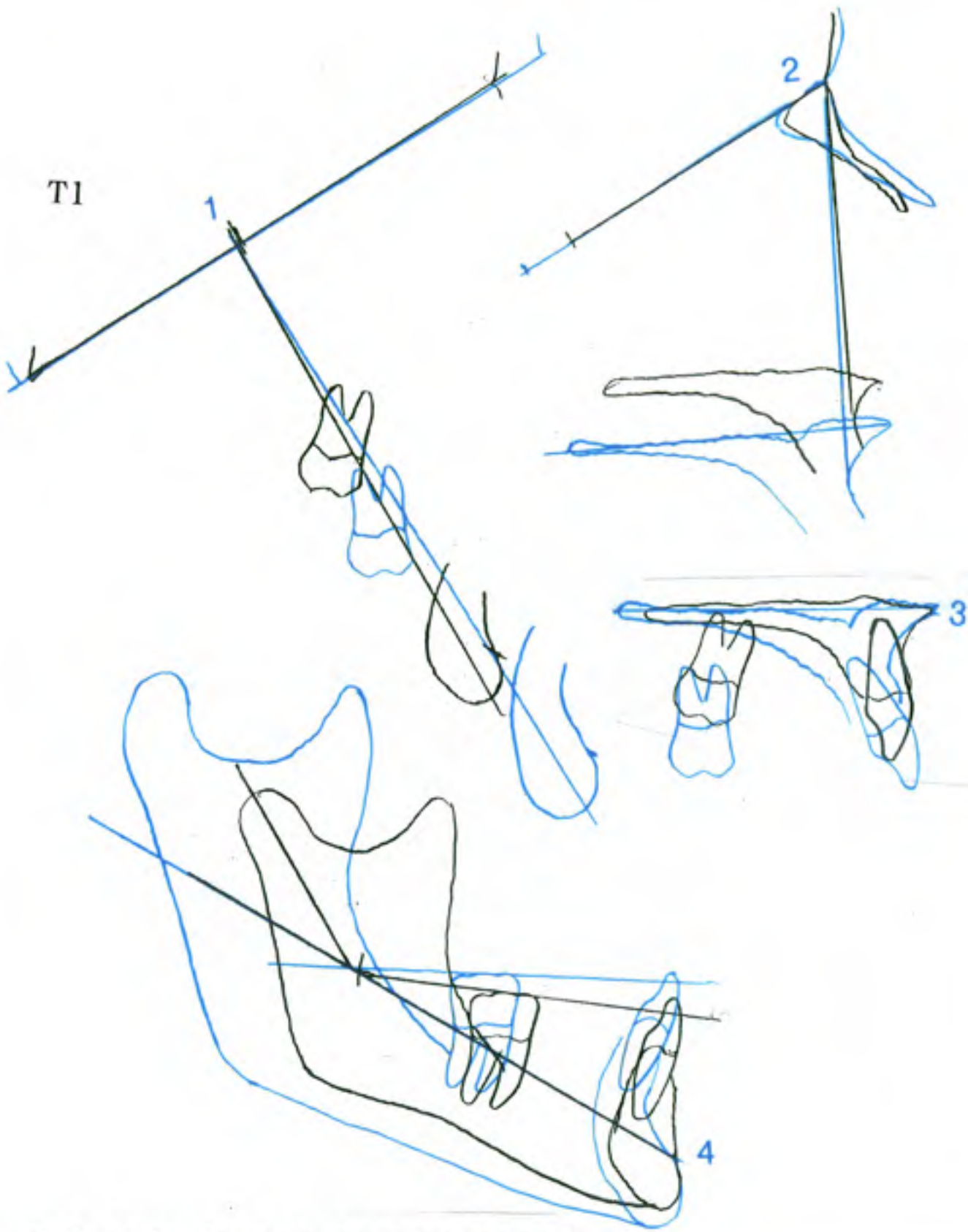
The comparison of the VTG (red) to the Actual (blue) as superimposed on the Facial Axis. Note the near perfect forecast of mandibular length. Nose growth and chin growth exceeded expectation.

FIG. 11-10-xvi



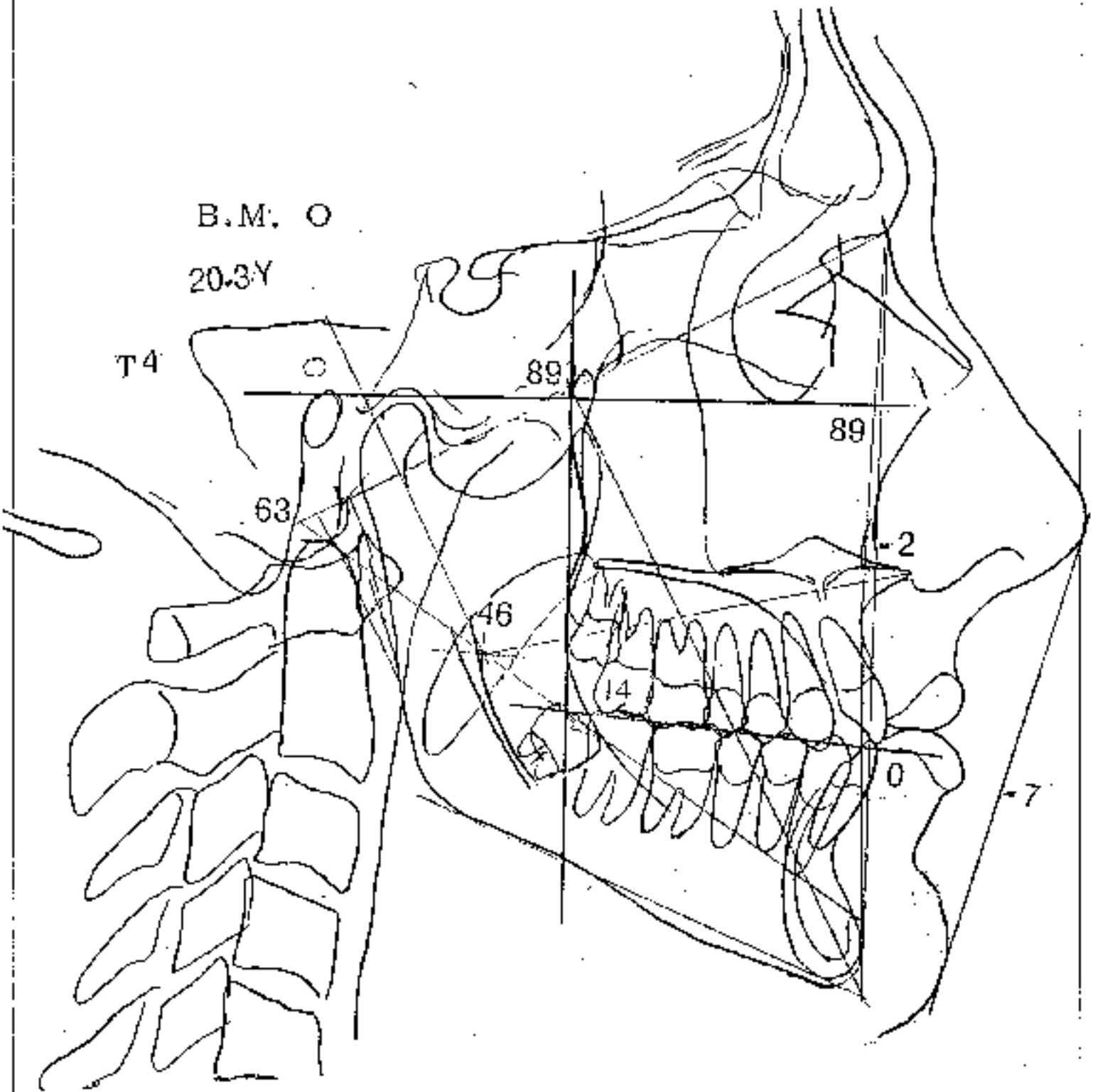
Facial features of B.M. at age 25 years. Note the soft tissue chin development.

FIG. 11-10-xv



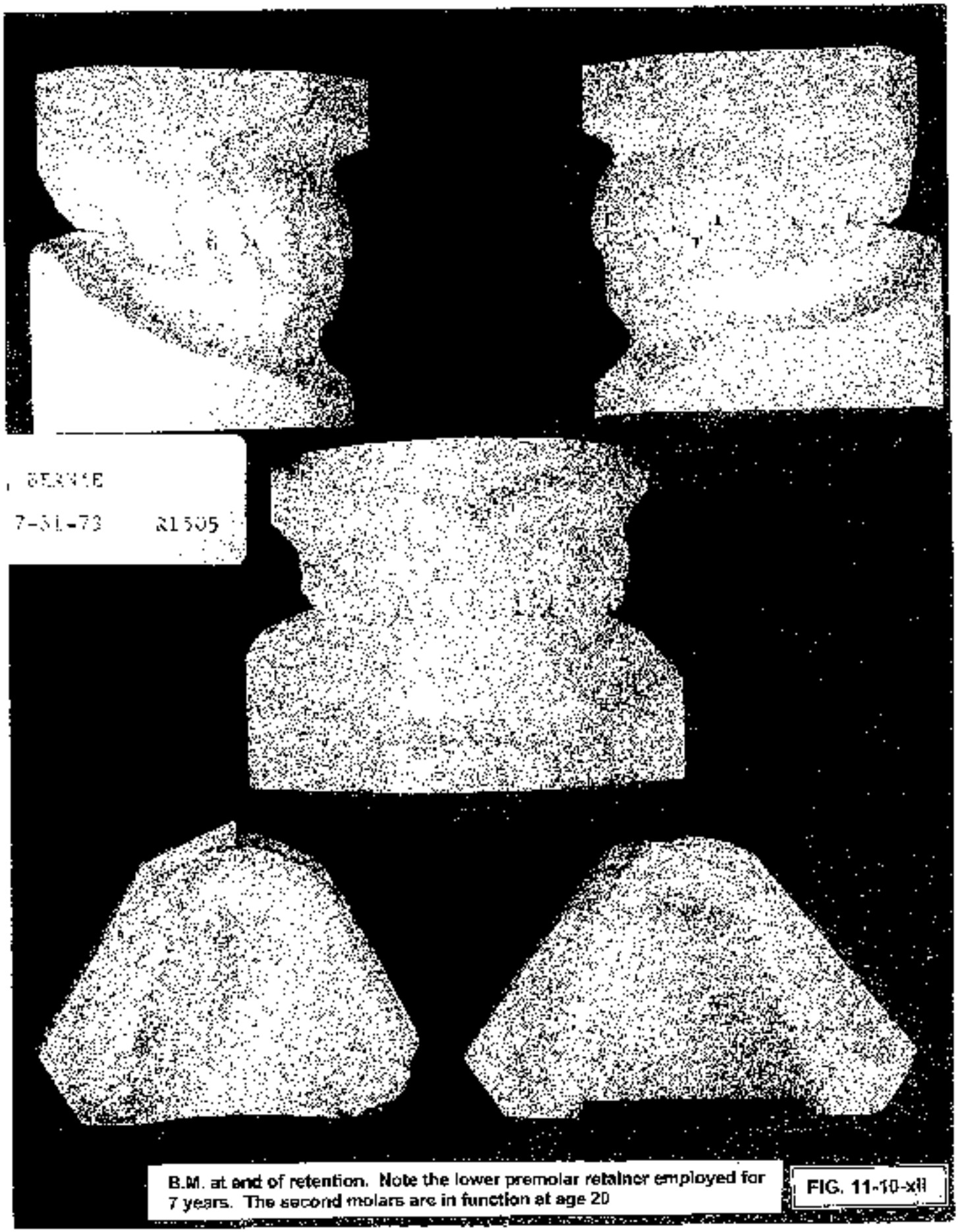
The Four Position Analysis from T1 to T4 (age 8 to age 20).
Position 1 shows a three degree closure of the Facial Axis.
A slight reduction of the maxilla was present. The upper molar was moved distally to the maxilla and the lower denture was moved distally.

FIG. 11-10-xiv



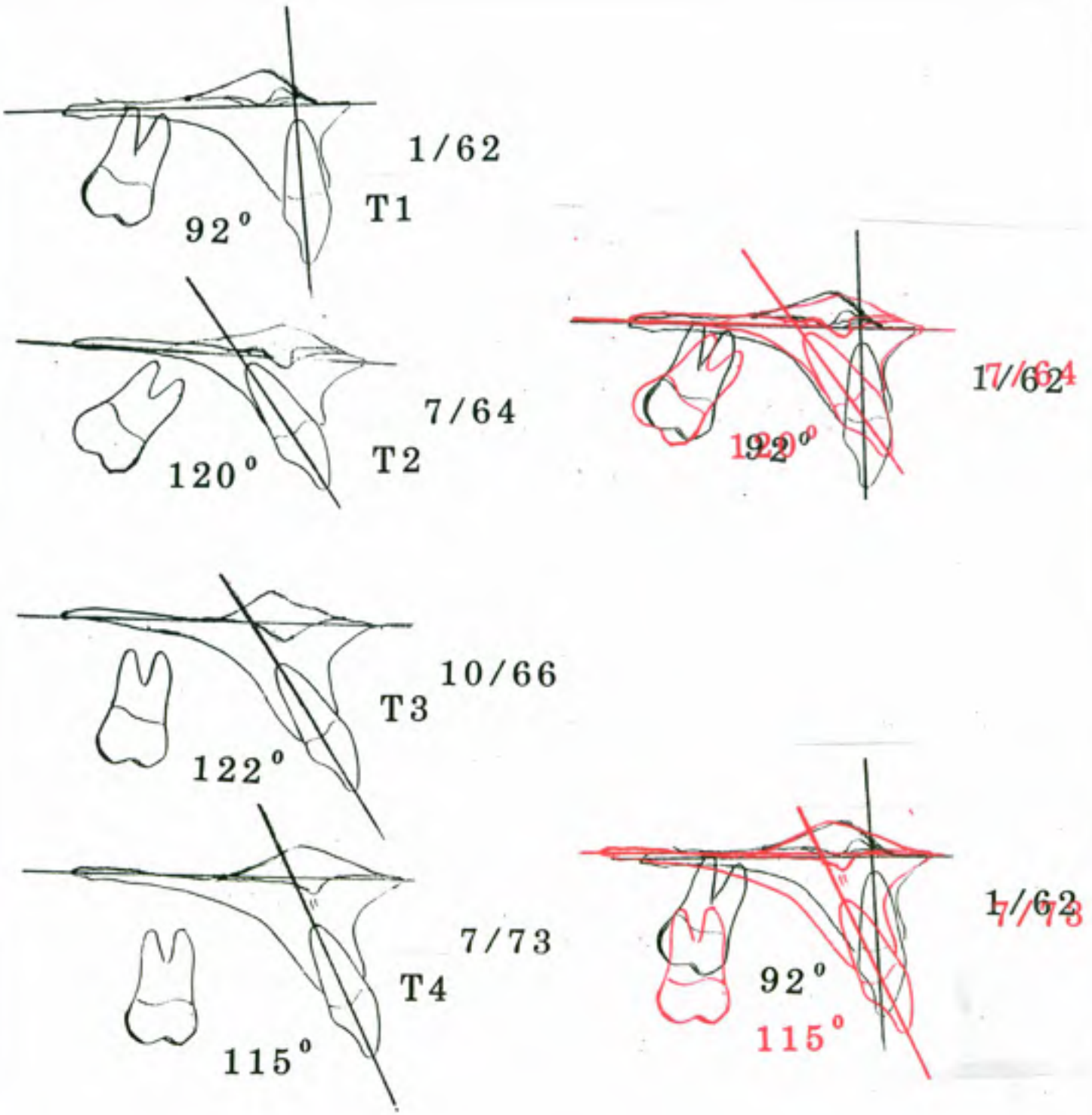
The development led to a 2 mm. concavity but the denture was remarkably stable at age 25. All third molars were extracted.

FIG. 11-10-xiii



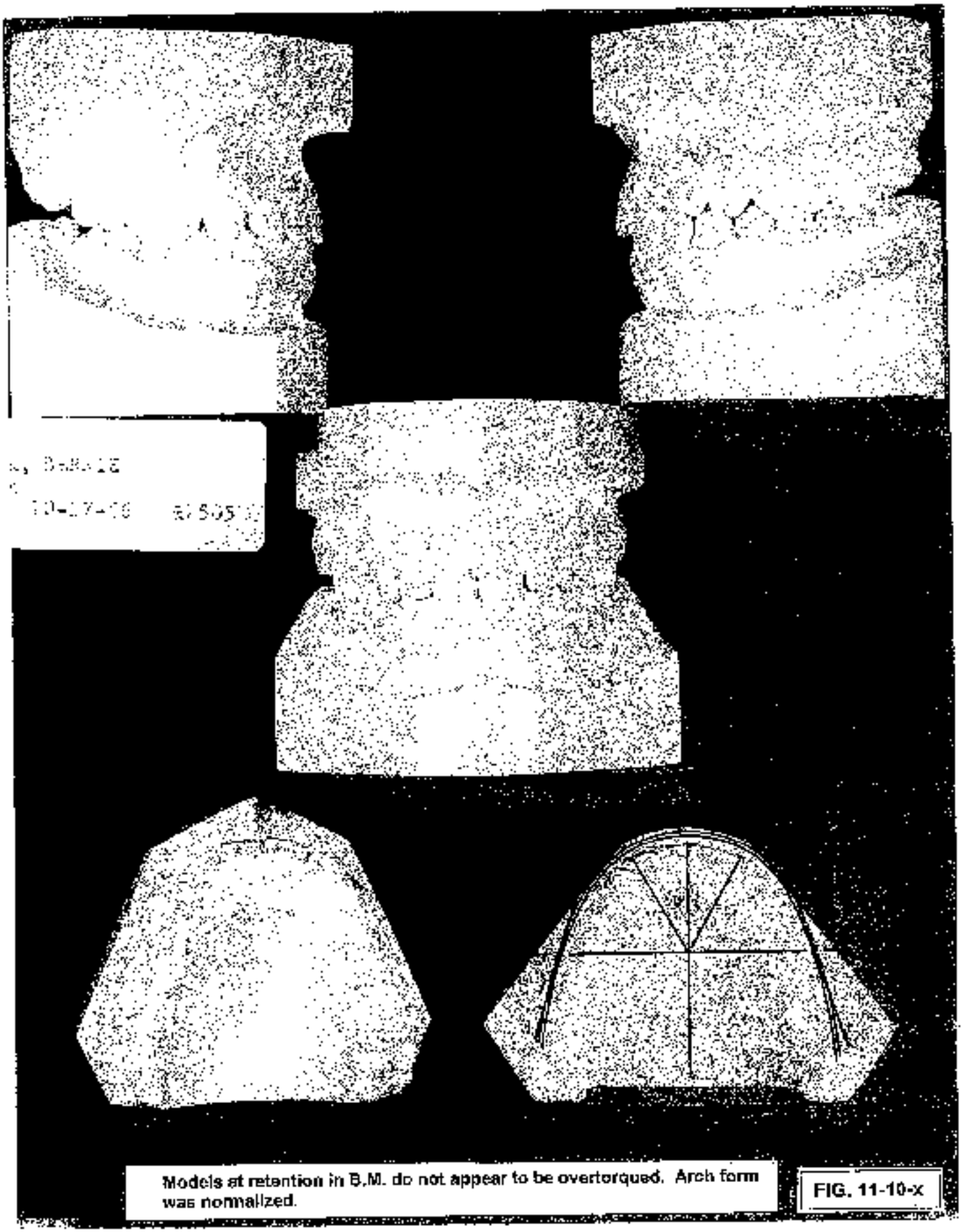
B.M. at end of retention. Note the lower premolar retainer employed for 7 years. The second molars are in function at age 20

FIG. 11-10-xii



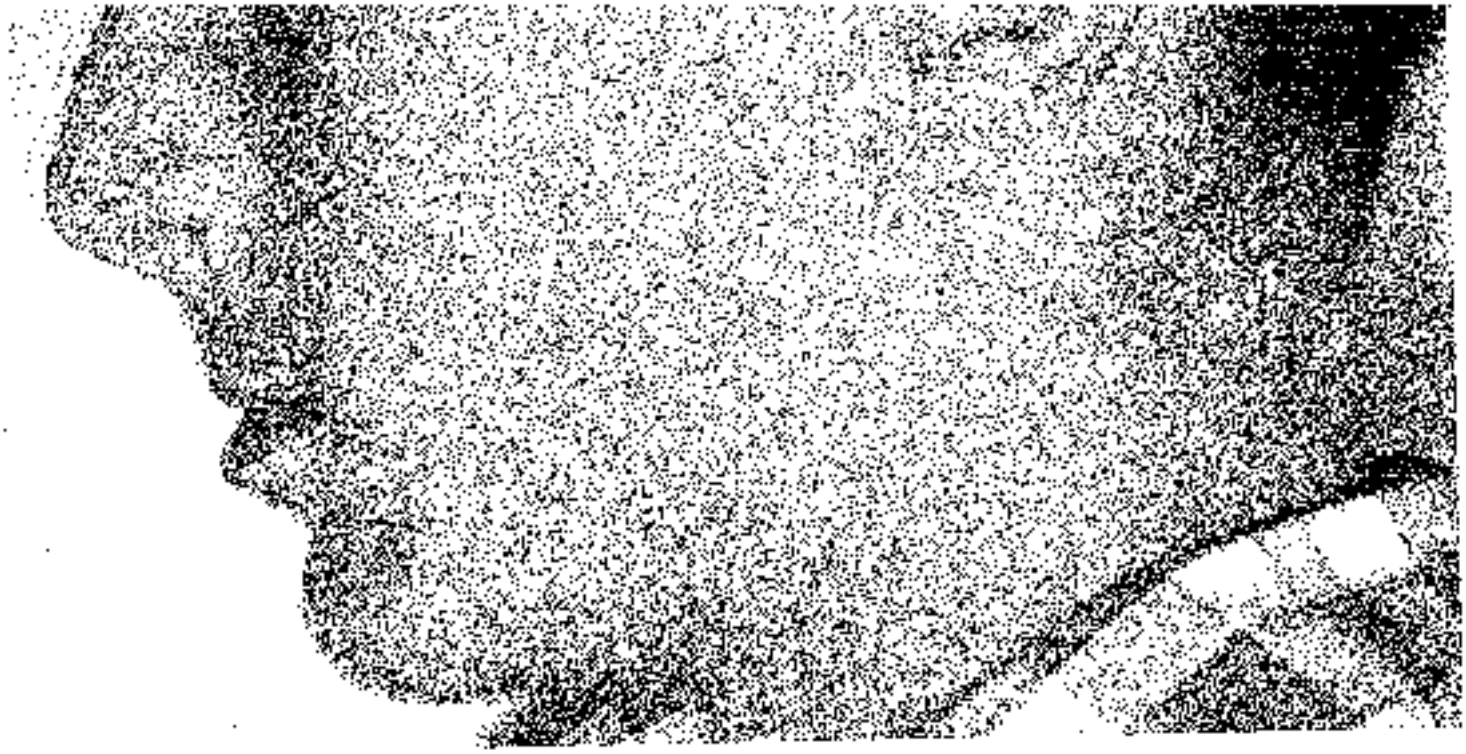
The progressive management of the upper incisors in patient B.M. Notice with the .016" blue Elgiloy the incisor was intruded 6 mm. and torqued palatally 28° between T1 and T2. At T4 it was still at 115° to the palatal plane.

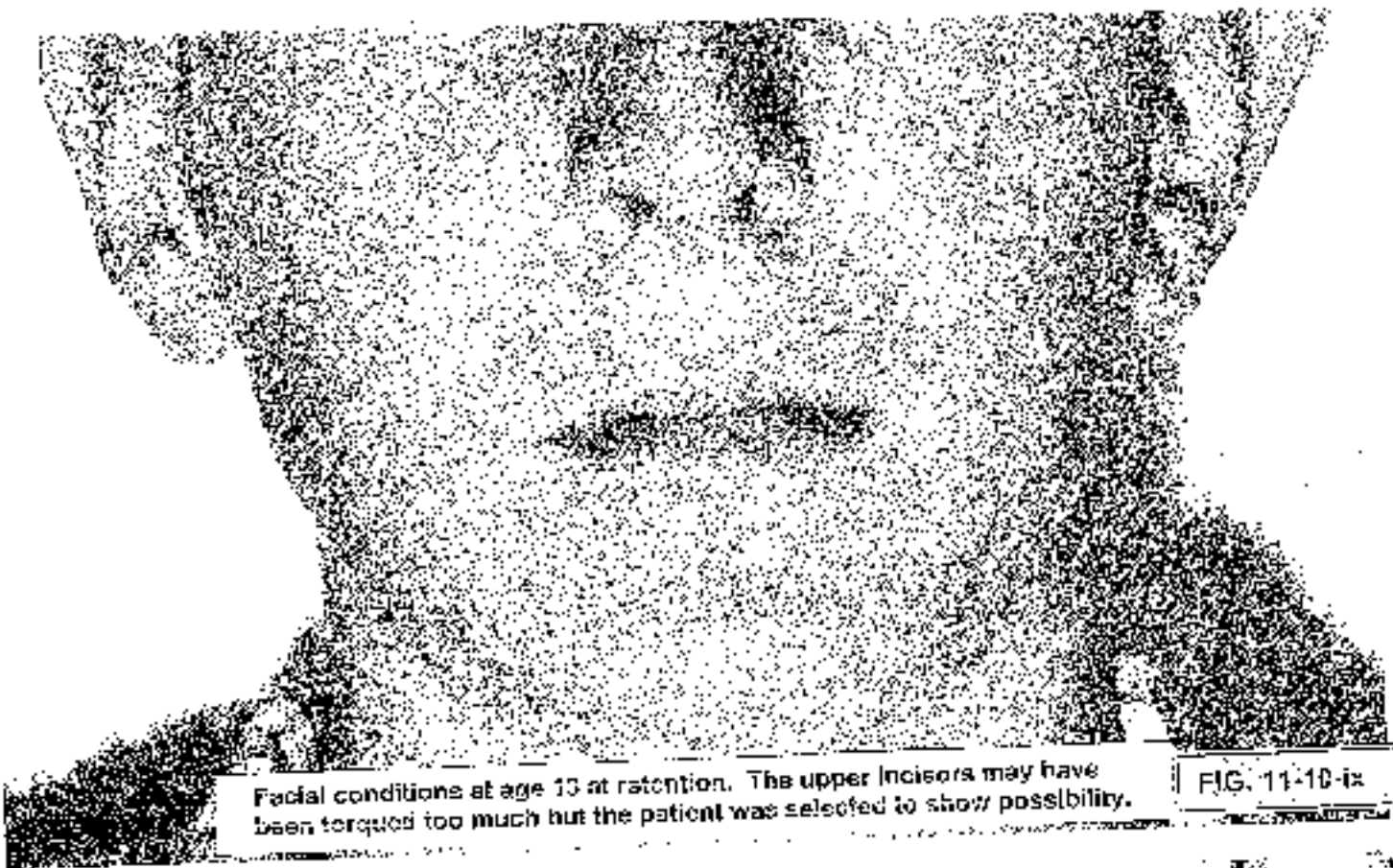
FIG. 11-10-xi



Models at retention in B.M. do not appear to be overtorqued. Arch form was normalized.

FIG. 11-10-x





Facial conditions at age 13 at retention. The upper incisors may have been torqued too much but the patient was selected to show possibility.

FIG. 11-10-ix

Case #11 R.M.e Severe Gummy Smile (Fig. 11-11 series)

This patient had been turned down for treatment by a colleague who prescribed waiting for permanent teeth in order to conduct Le Fort surgery for maxillary impaction for the correction of a very severe gummy smile. The father however sought treatment without surgery. The VTO suggested treatment would be appropriate at age 8 years. The bite was completely closed and the lower deciduous canines were already missing due to crowding.

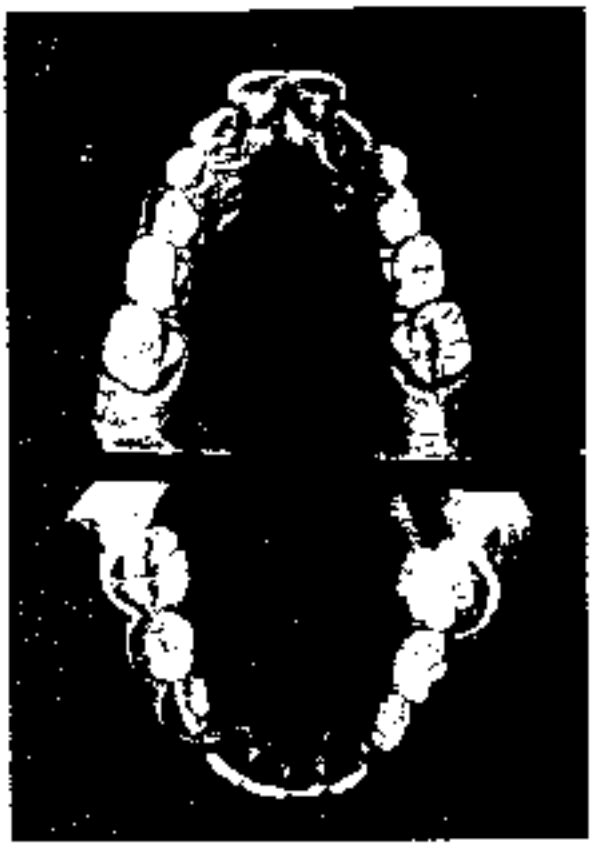
Treatment

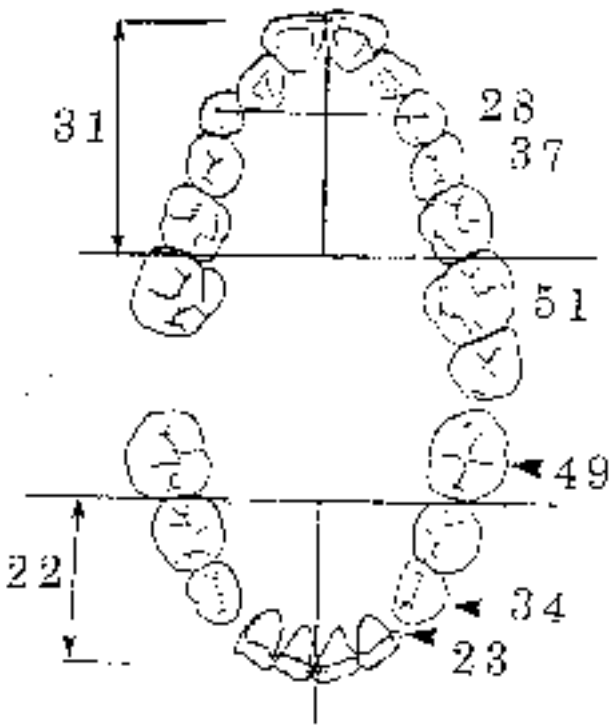
An intrusion utility arch wire was placed in both the upper and lower arches. The upper incisors were augmented by a Jarabak type high pull at the midline, at night only, with a force of **only 50 grams per side.**

All four upper incisors were intruded more than a centimeter. The upper canines were free to drift. Later then ligated upward to the utility wire for their intrusion.

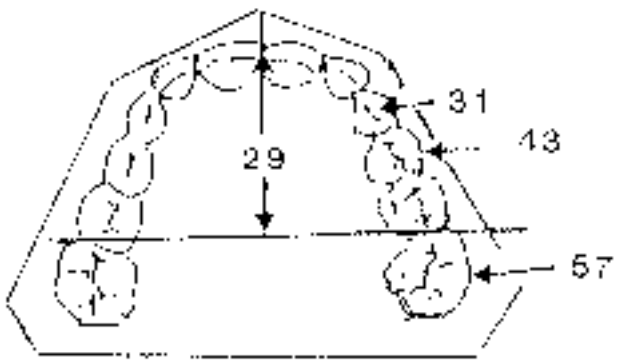
Finishing at the permanent dentition included intraoral elastic traction employed to reduce the Class II completely. The patient was retained at end to end incisor relation.

By age 19 years, the patient smiled with normal lip esthetics. More vertical growth occurred than expected but esthetic harmony prevailed.



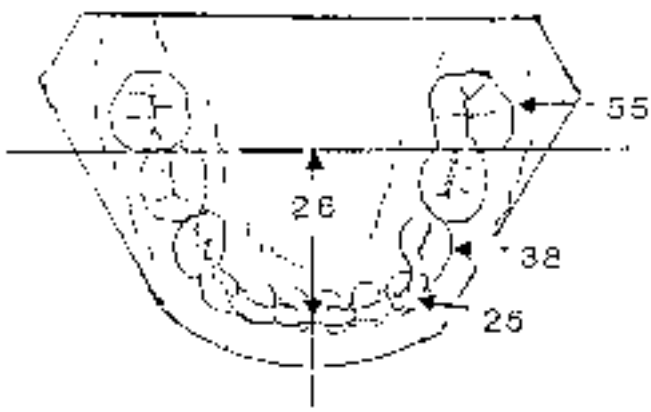


R.M. ♂ Age 11 Yr.



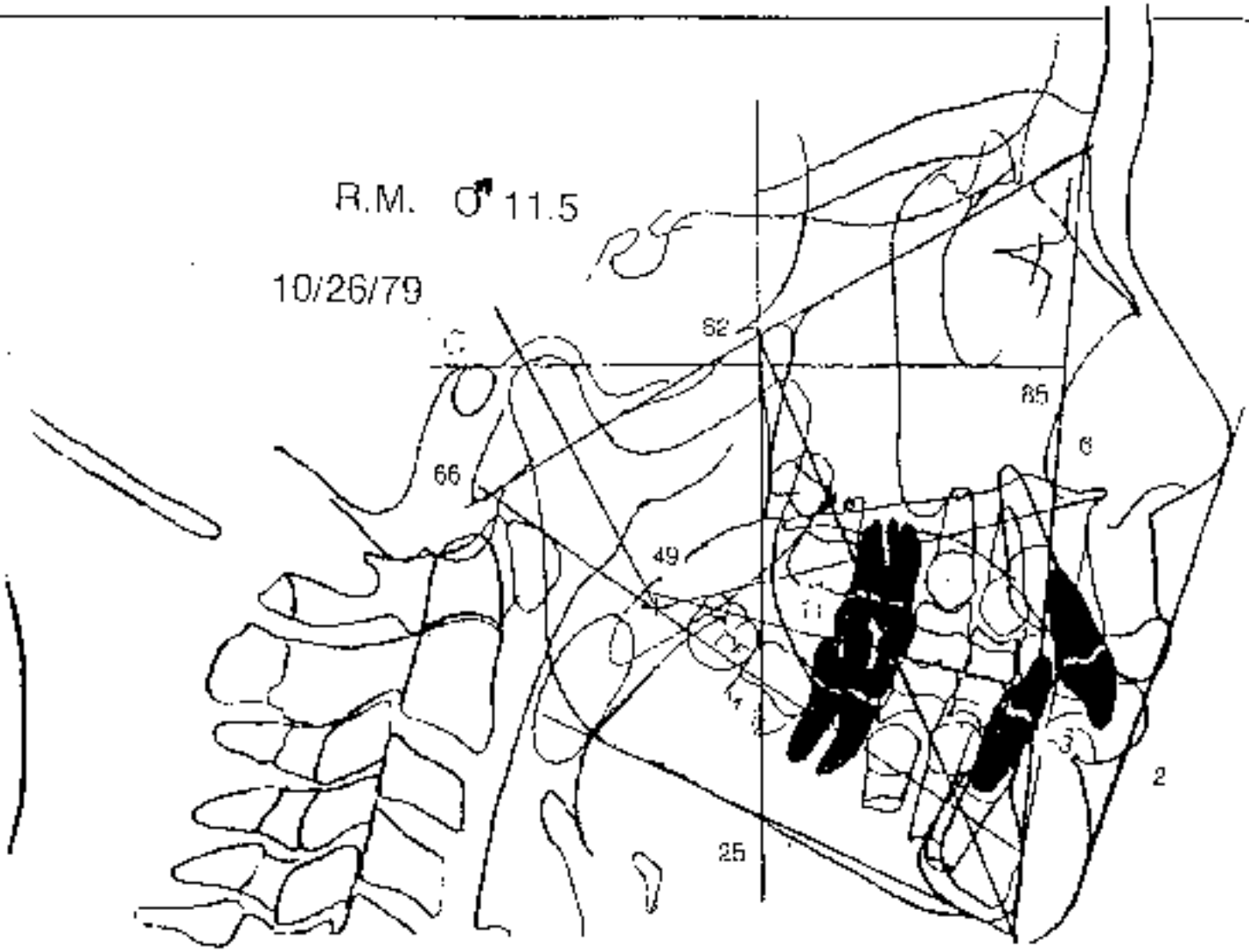
Control

MIXED Age 8 Yr.

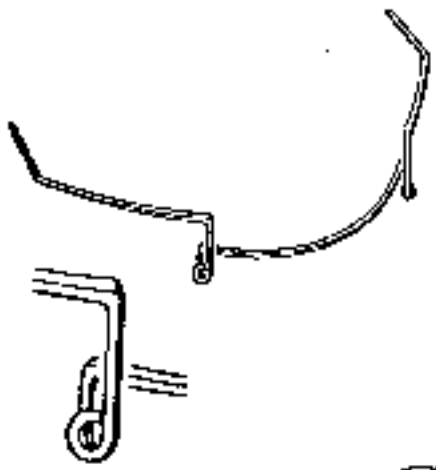


Male patient with severest type of gummy smile. Closed bite Class II and premature loss of deciduous canines. Note arch dimensions compared to mean controls.

FIG. 11-11-i



MAXILLARY TORQUING ARCH (STEPPED) .016 x .016 blue ELGILOY®

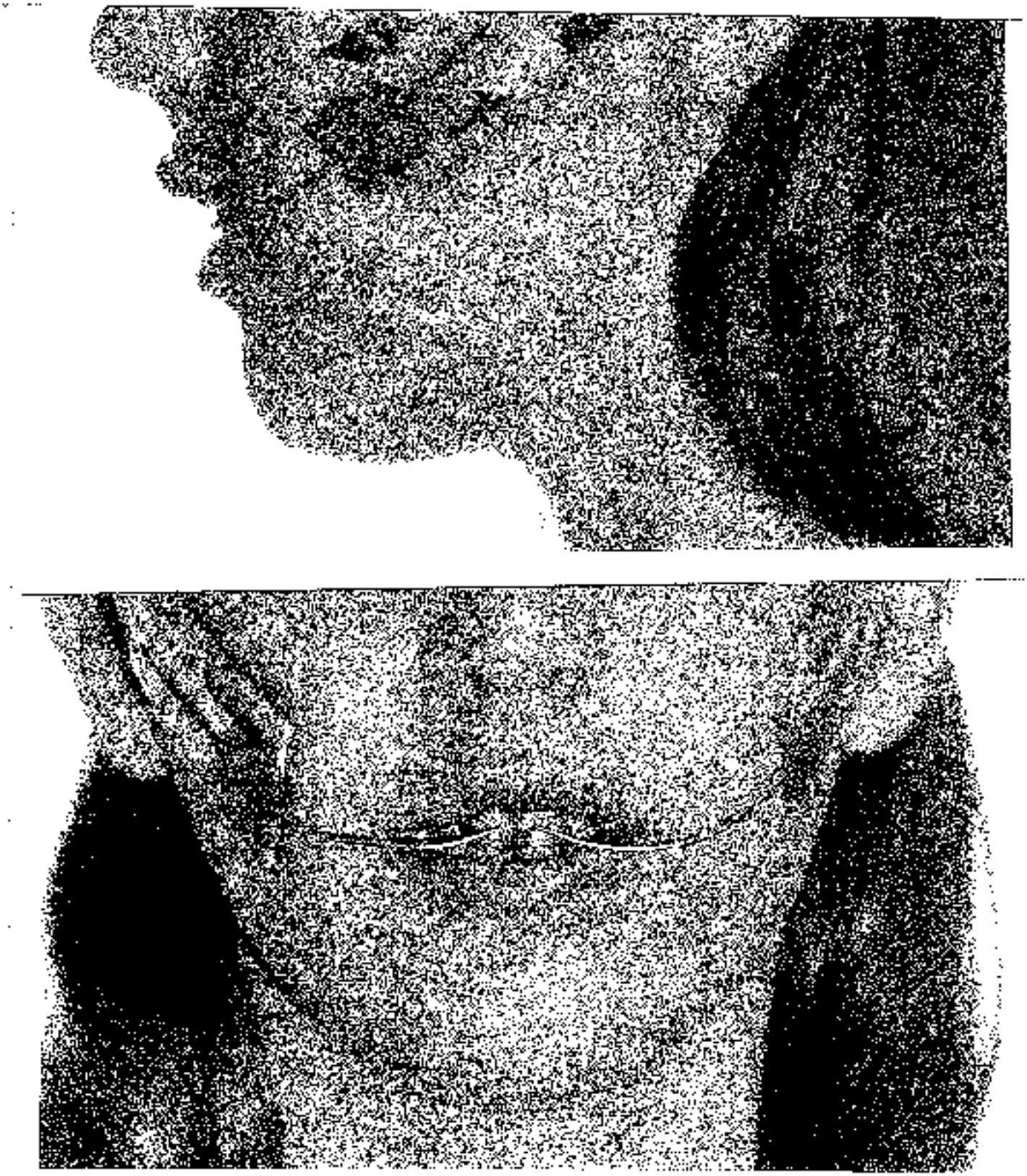


NON-EXTRACTION

EXTRACTION

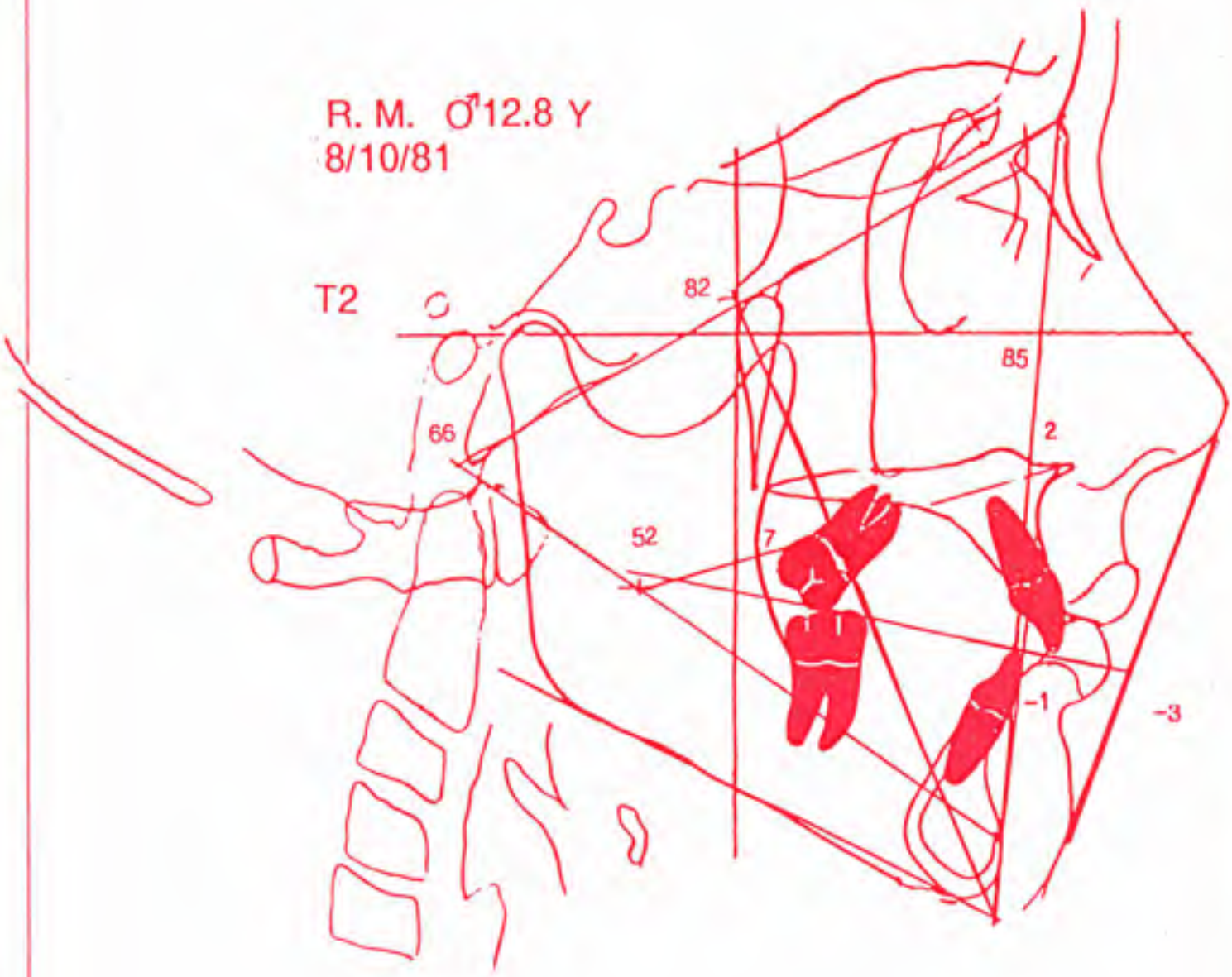
Abstract analysis shows 82° Facial Axis and 6 mm. convexity (two S.D. toward dolichofacial). One type intrusion torquing arch is shown and augmented with high-pull off the anterior segment.

FIG. 11-11-ii



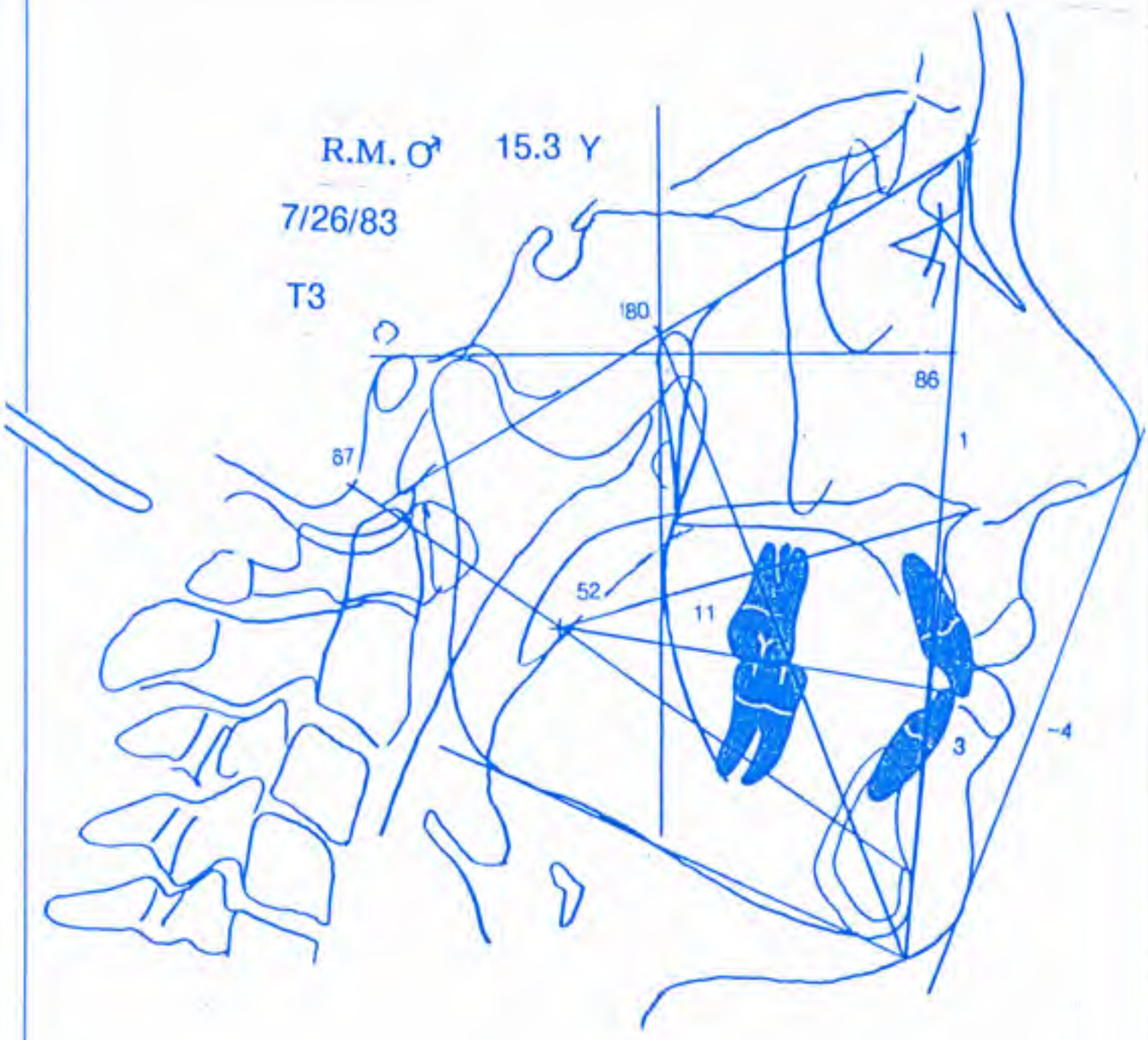
Type of high-pull employed for R.M. Note hooks at the midline.

FIG. 11-11-iii



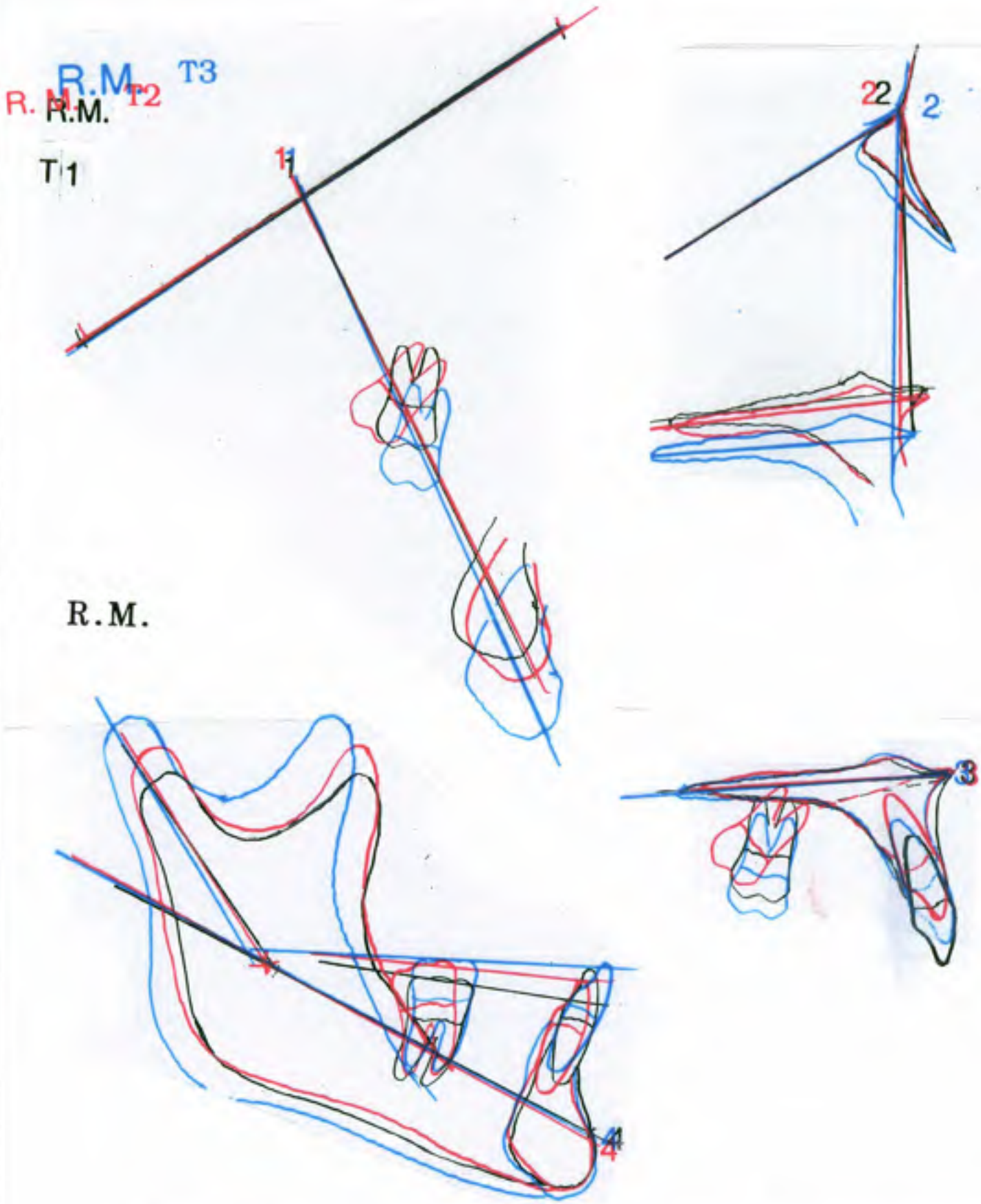
R.M. After one year of Utility Arch intrusion mechanics in both arches. Note tipping of molars which recovered. Note the tip of the root of the upper incisor approaches the line from Xi to ANS.

FIG. 11-11-iv



Patient R.M. during retention at age 15. Note the harmonious relations despite a 80° Facial Axis. The patient remained stable.

FIG. 11-11-v



A progressive four position analysis to show the behavior in patient R.M.
Black - original, red - progress and blue - during retention.

FIG. 11-11-vi

III. CLASS II AND CLASS I TREATED WITH COMBINATION OF CERVICAL TRACTION AND INTRAORAL ANCHORAGE - *Group Six*

Case #12 D.N.? Severe Class II Div 1 with Lower Lip Sucking Habit

This 5 year old female was seen with a major lip and speech problem. The lower lip was hypertrophied from trauma. A severe **sublabial contraction** was noted. The VTO called for forward movement of the lower arch and a major orthopedic reduction of the maxilla (**Fig. 11-12 series**).

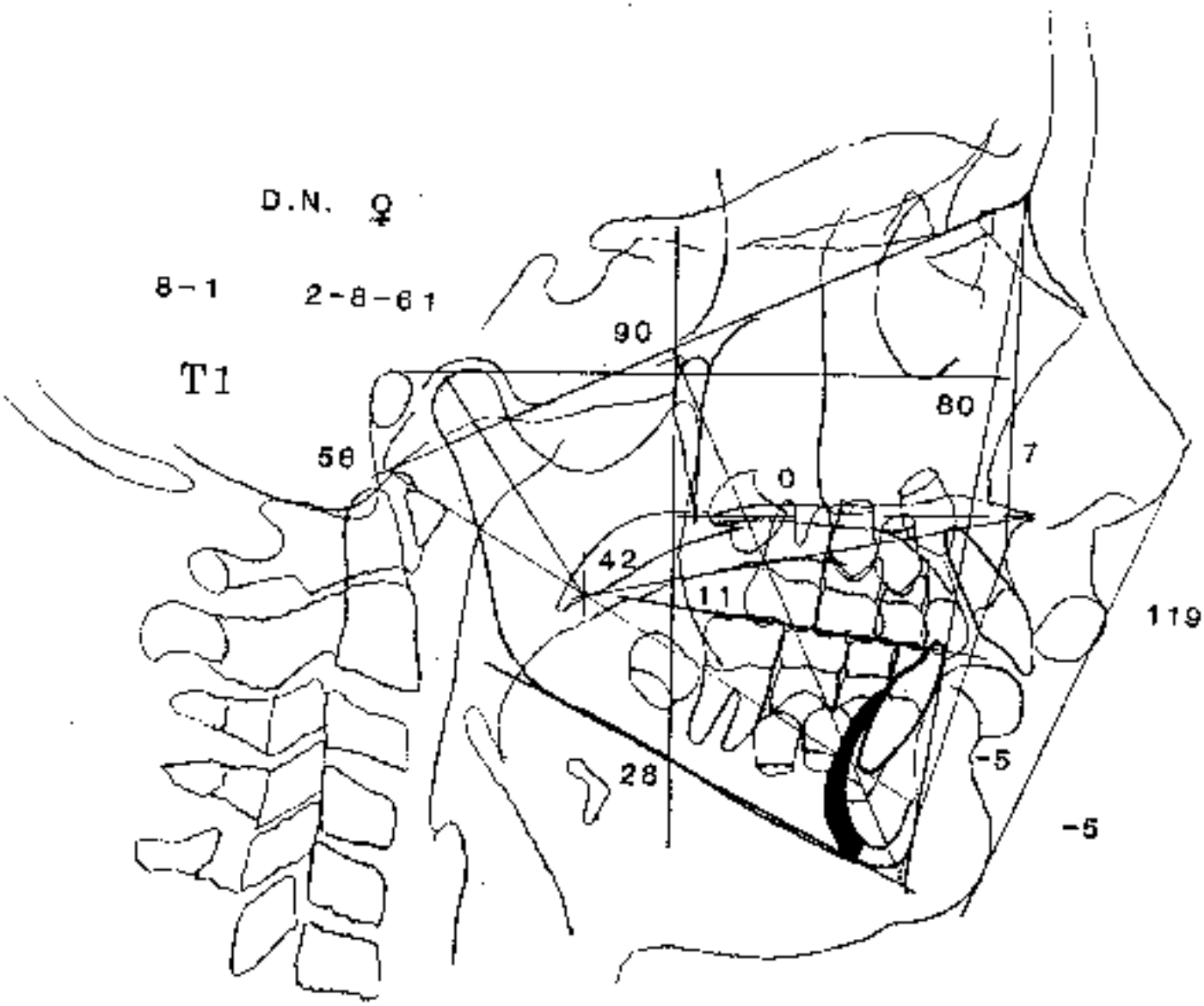
Treatment

A cervical traction face bow was applied for maxillary reduction for one year. A straight .016" wire was employed to intrude the lower incisors and torque the lower first molar roots buccally. Elastics (**200 grams per side**) were employed to further correct the arch relationship.

The heavy elastics actually temporarily bent the mandible, similar to the reaction to posturing appliances. A second phase at the full dentition was applied for details and overtreatment to an end to end was achieved. The patient was stable when last seen at age 40.

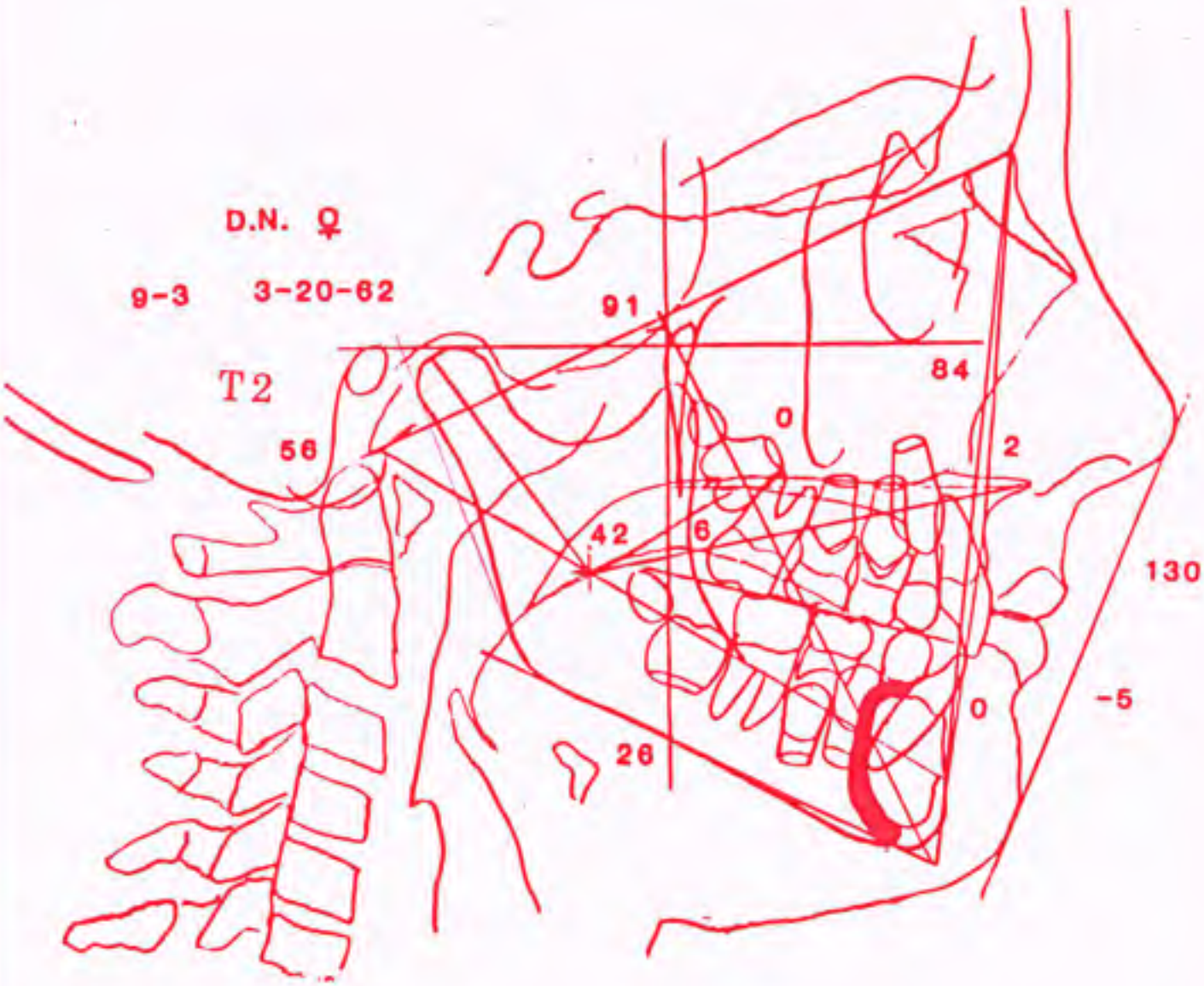
Comments:

Treated currently, this patient would receive the quadratus inferioris lip release surgery in order to free the restricted lower arch to move forward.



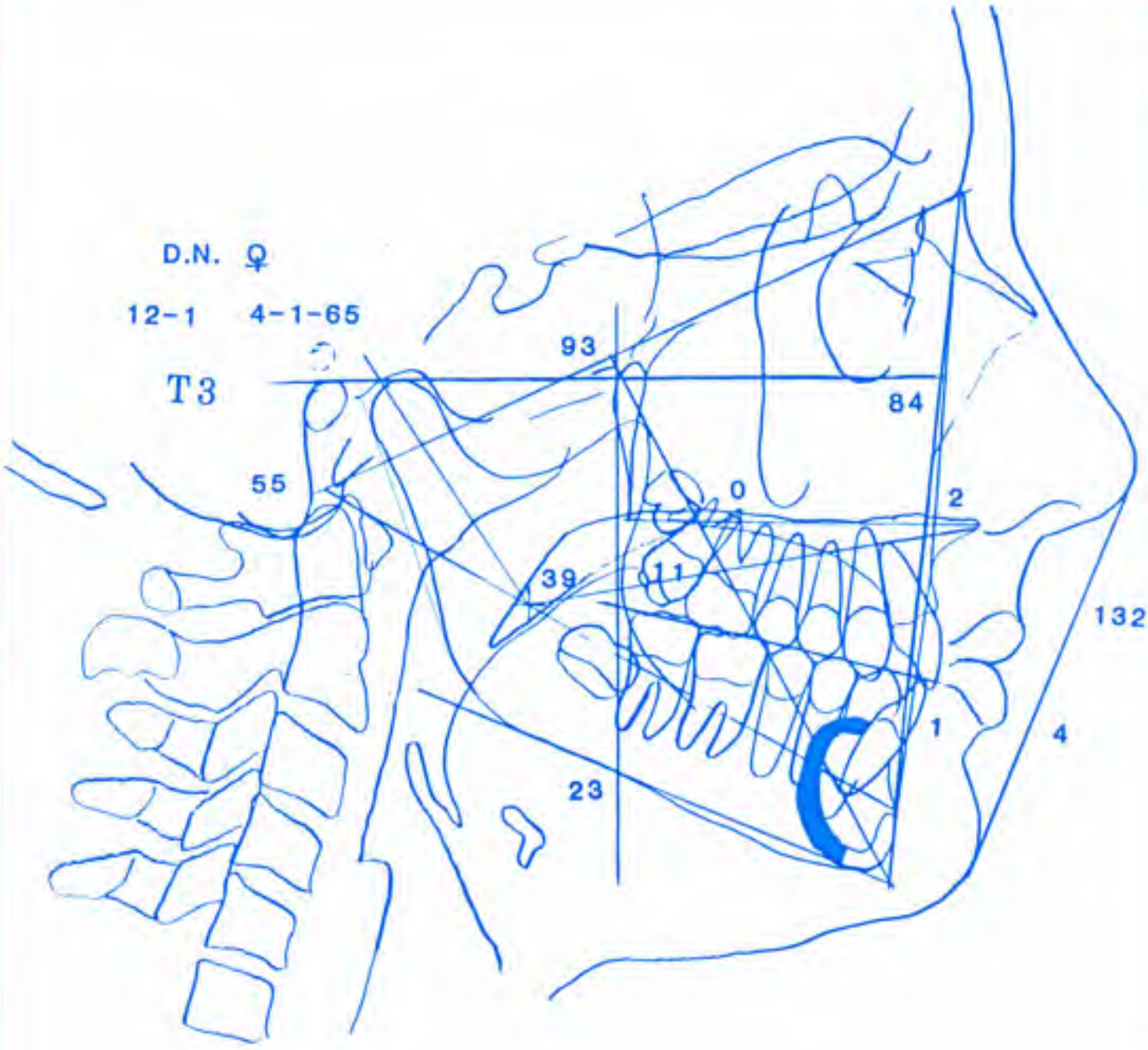
T1 Patient D.N. a female age 8 with lower lip contraction.
Very severe Class II with high convexity but normal mandible.
Patient was treated with cervical traction by night and intermaxillary elastic by day.

FIG. 11-12-I



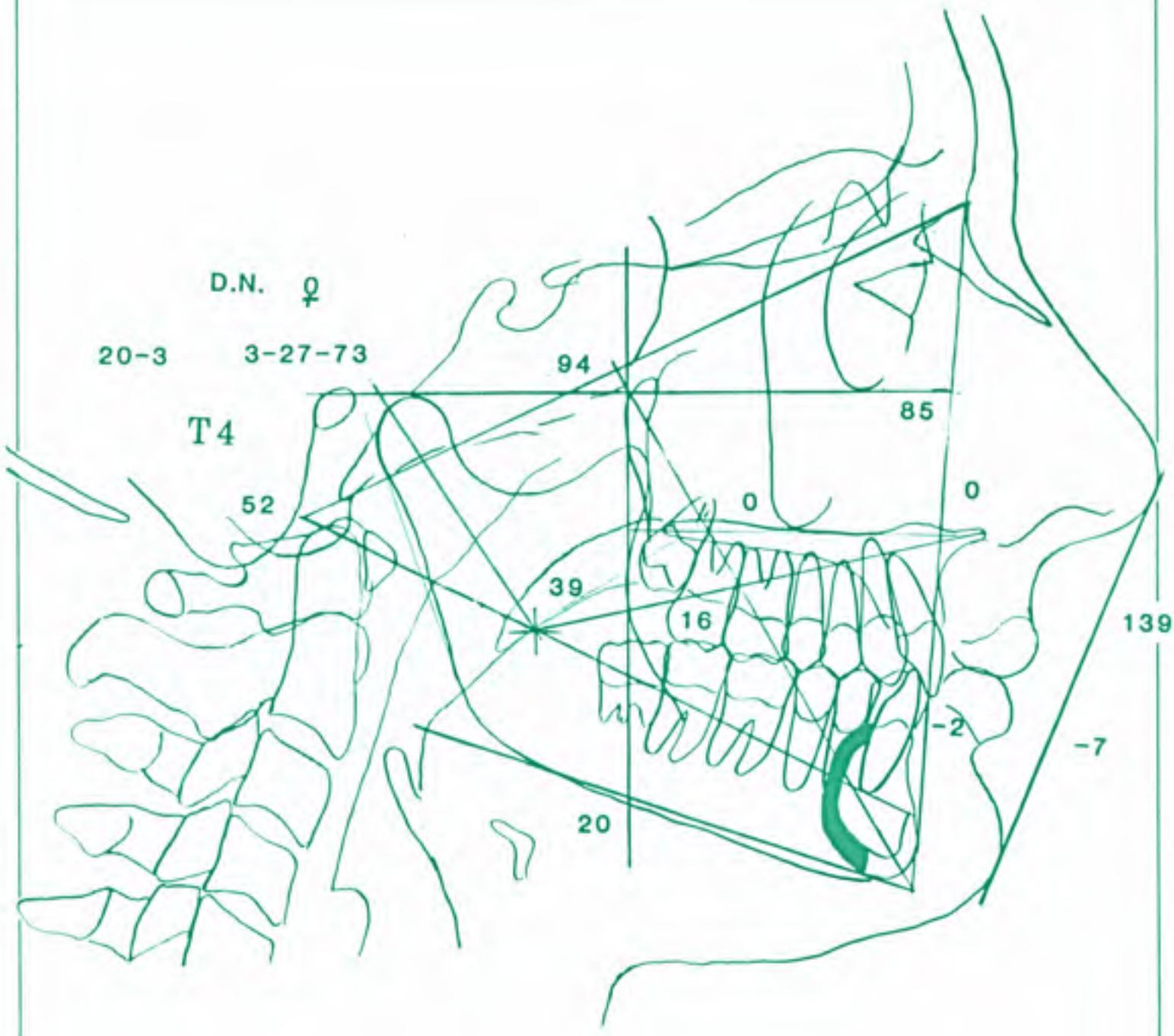
T2 After one year of first stage treatment. The attempt was made to move the lower arch forward. Note the opening in the bend in the mandible with strong elastics (250 grams per side).

FIG. 11-12-ii



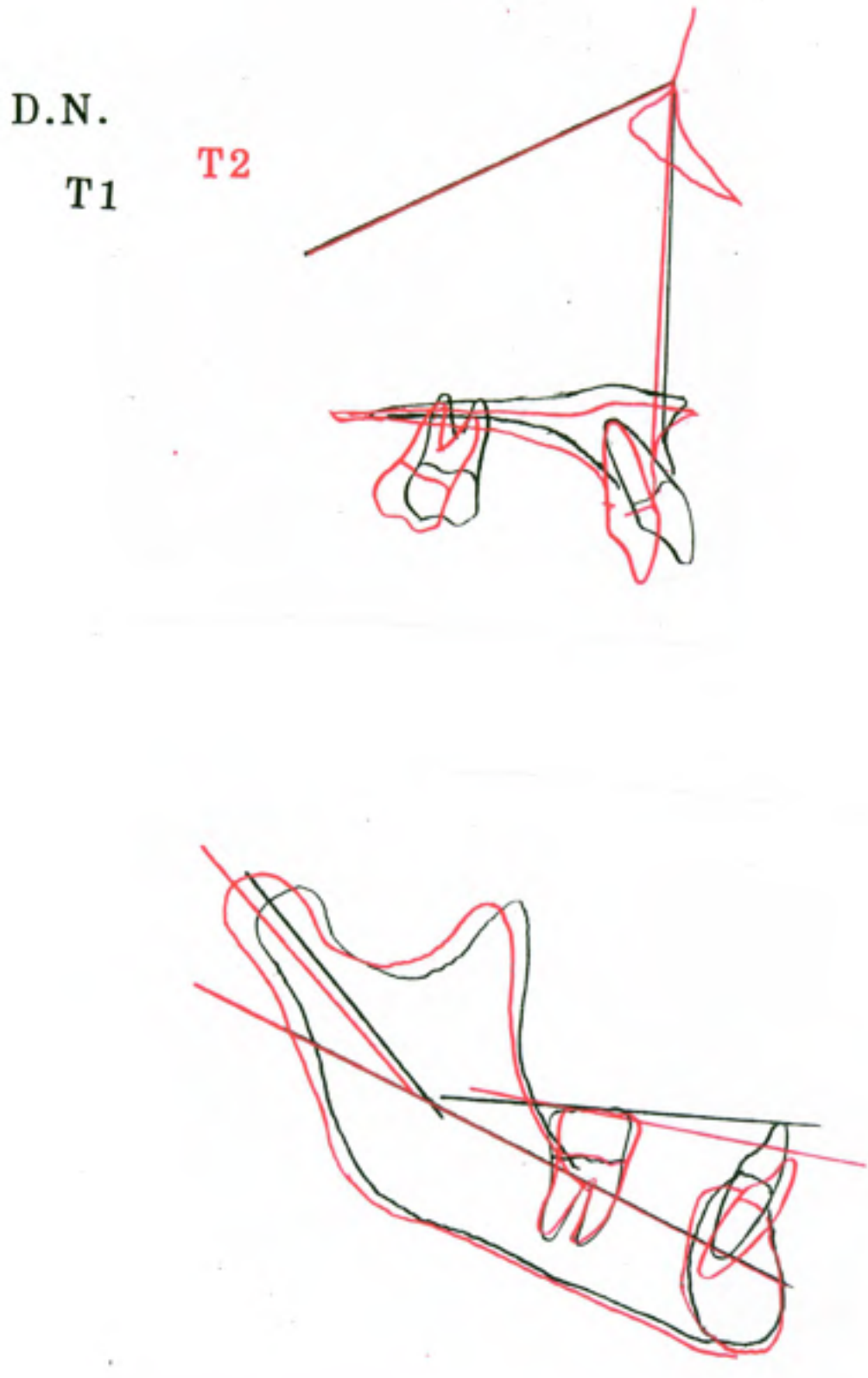
T3 The patient D.N. was completed and overtreated to protect against the tight lower lip. Notice the 93° Facial Axis and less than 2 mm. convexity.

FIG. 11-12-iii



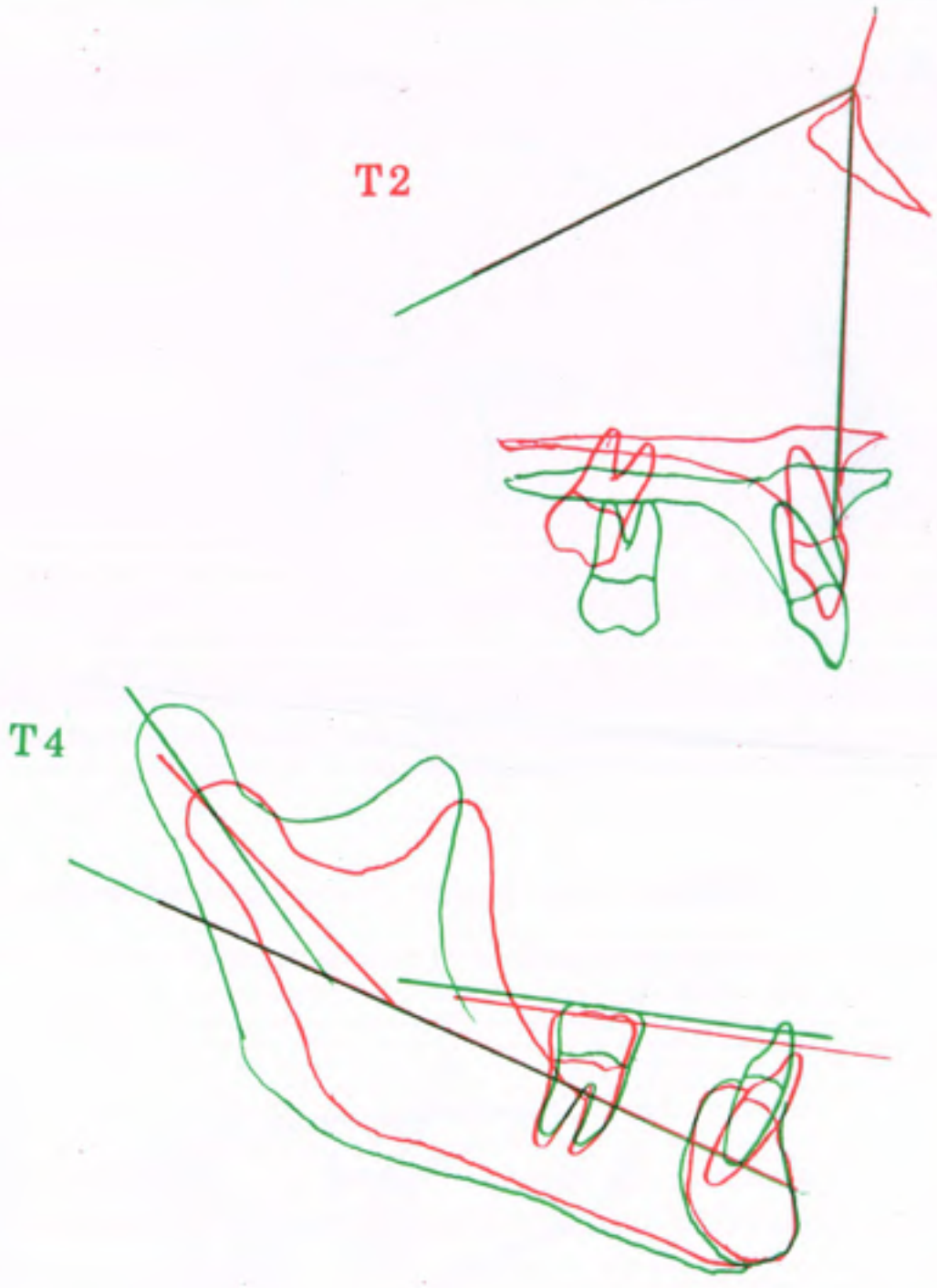
T4 D.N. at age 20 locked into a tight Class I with still the tight lower lip. Lower incisor is –2 mm. to the APo Plane. Lowe lip is –7 mm. to the E Line. She stayed there.

FIG. 11-12-iv



T1 compared to T2 for the maxilla and upper teeth. The mandible bent open with the vigorous elastics. Note lower incisor intrusion but no anchorage loss of the molar.

FIG. 11-12-v

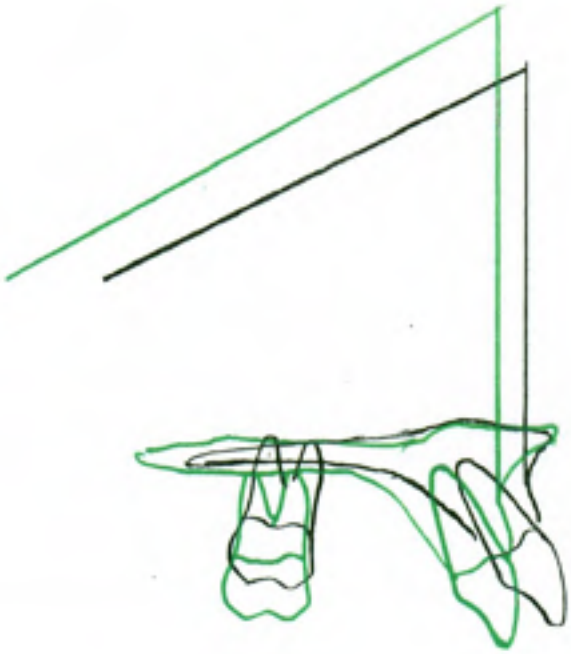


T2 compared to T4 to show recovery characteristics. The mandible grew as predicted to do.

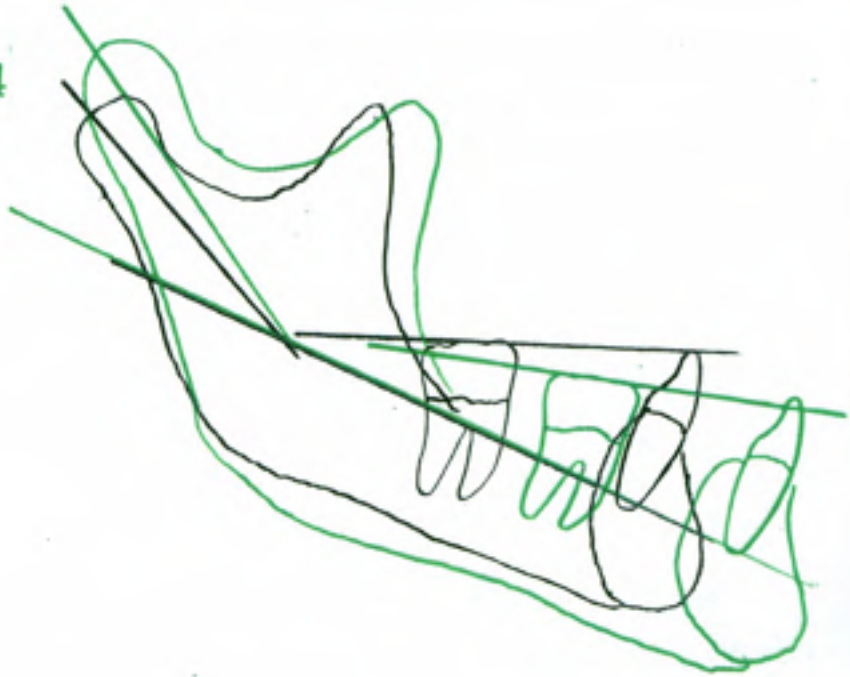
FIG. 11-12-vi

D.N.

T1



T4



T1 to T4 compared to show final changes from age 8 to age 20 years.

FIG. 11-12-vii

Case #13 D.W.♀ Class I Crowded Lower Teeth and Closed-Bite

The patient was seen at age 10 with imbrication in the lower arch and mesial drift of lower buccal segments. Moderate convexity was present and slight asymmetry was evident (**Fig. 11-13 series**).

Three choices were available. First, simple observation could be conducted but this would risk worsening. Second, serial extraction might be performed. This, at the time was considered but that decision would risk further closing of the bite. The third choice could be to increase arch length by both arch elongation and buccal expansion. The latter was the decision for this child when the forecasts were studied.

Treatment

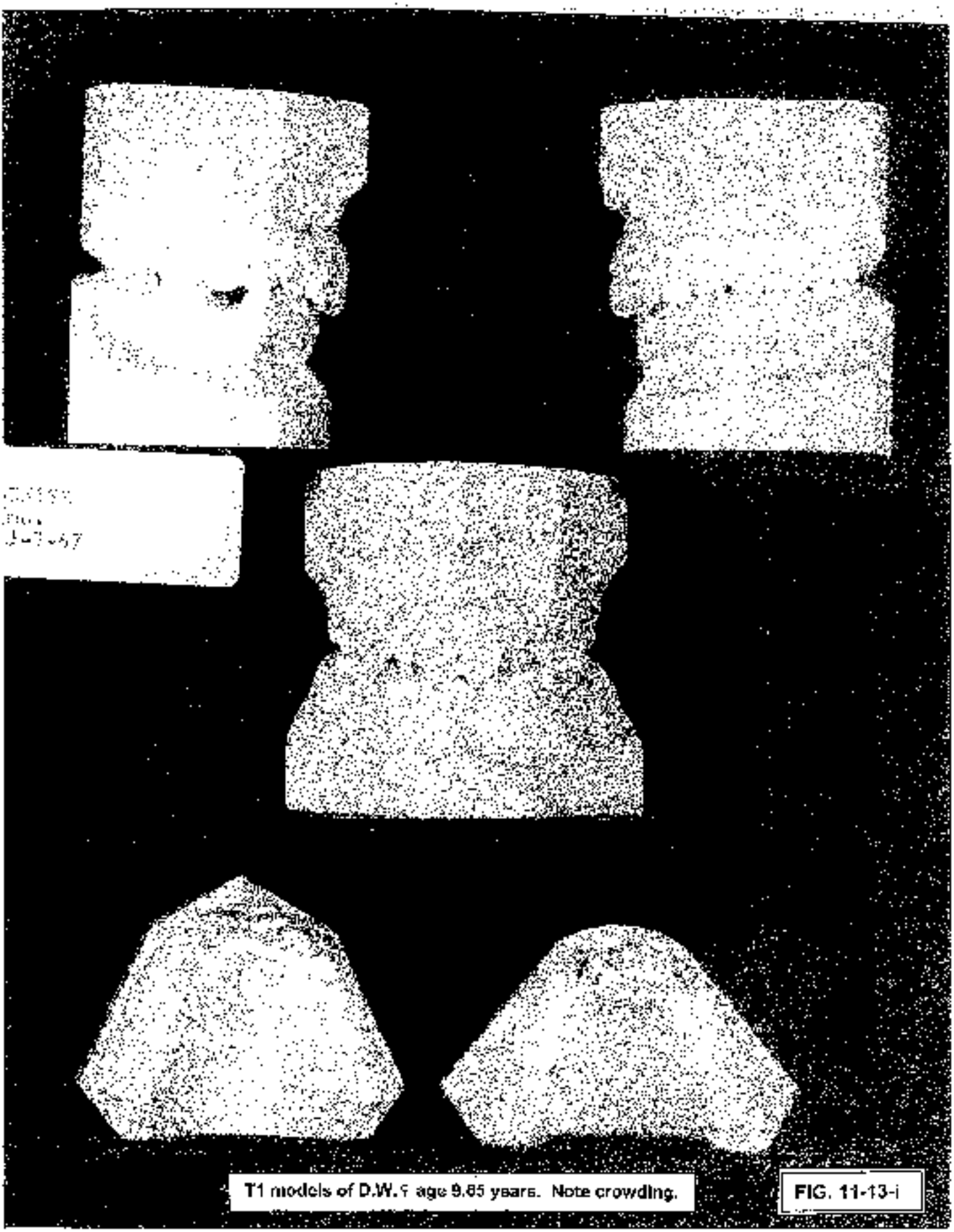
The first permanent molars were banded in both arches. An advancing concatenated utility arch was employed in the lower. **This procedure moved the lower molars distally.** It also induced the deciduous molars to spread laterally. The permanent canines were pushed outward simply by pressure from the lateral incisors as the intercanine width was increased from 23 to 28 mm. (or 5.0 mm.).

Light cervical traction was employed for the upper arch. This action moved the molars distally **and laterally.** The dental bow **shielded the upper and lower premolar area** from lip pressure. Width increase in the upper, to match the lower, was achieved.

As the permanent dentition developed, a full .018 bracket system was applied in order to perfect the therapeutic occlusal relationship. Ten years later the lower incisors were interproximally reduced by 1.0 mm. for arch length benefits. The intercanine width settled at 25.5 mm.

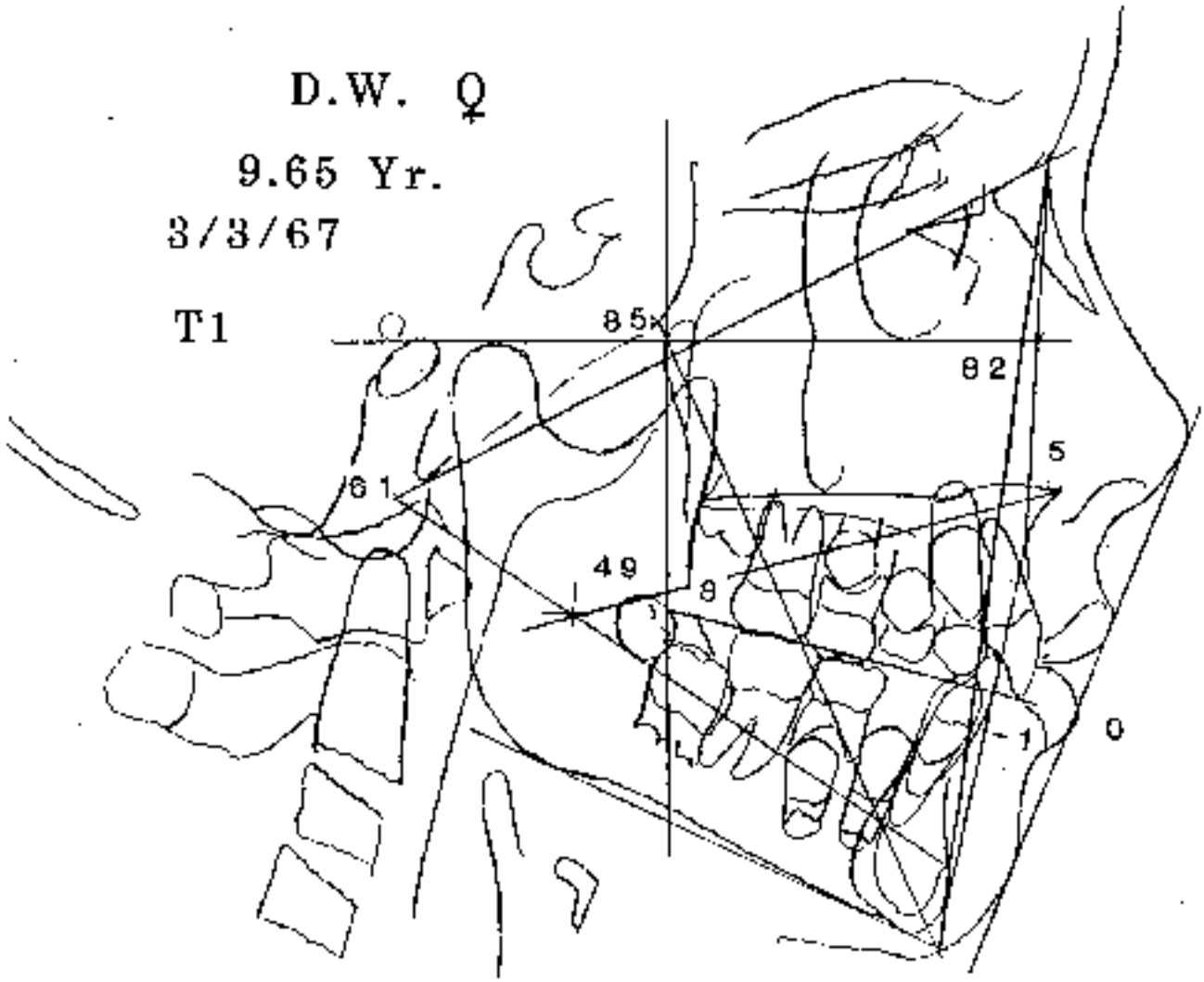
Comments:

Class I crowding is the most common malocclusion in the caucasian race. In the doctrine of limtation era the removal of four deciduous canines was the most common practice. This was often the first step in a progressive extraction. With long range forecasts and with **arches often too narrow to be attractive in the smile** and with 0.5 grams per mm². of pressure of the root on the buccal alveolar walls expansion has been proven successful. This patient demonstrates one method of treating such conditions.



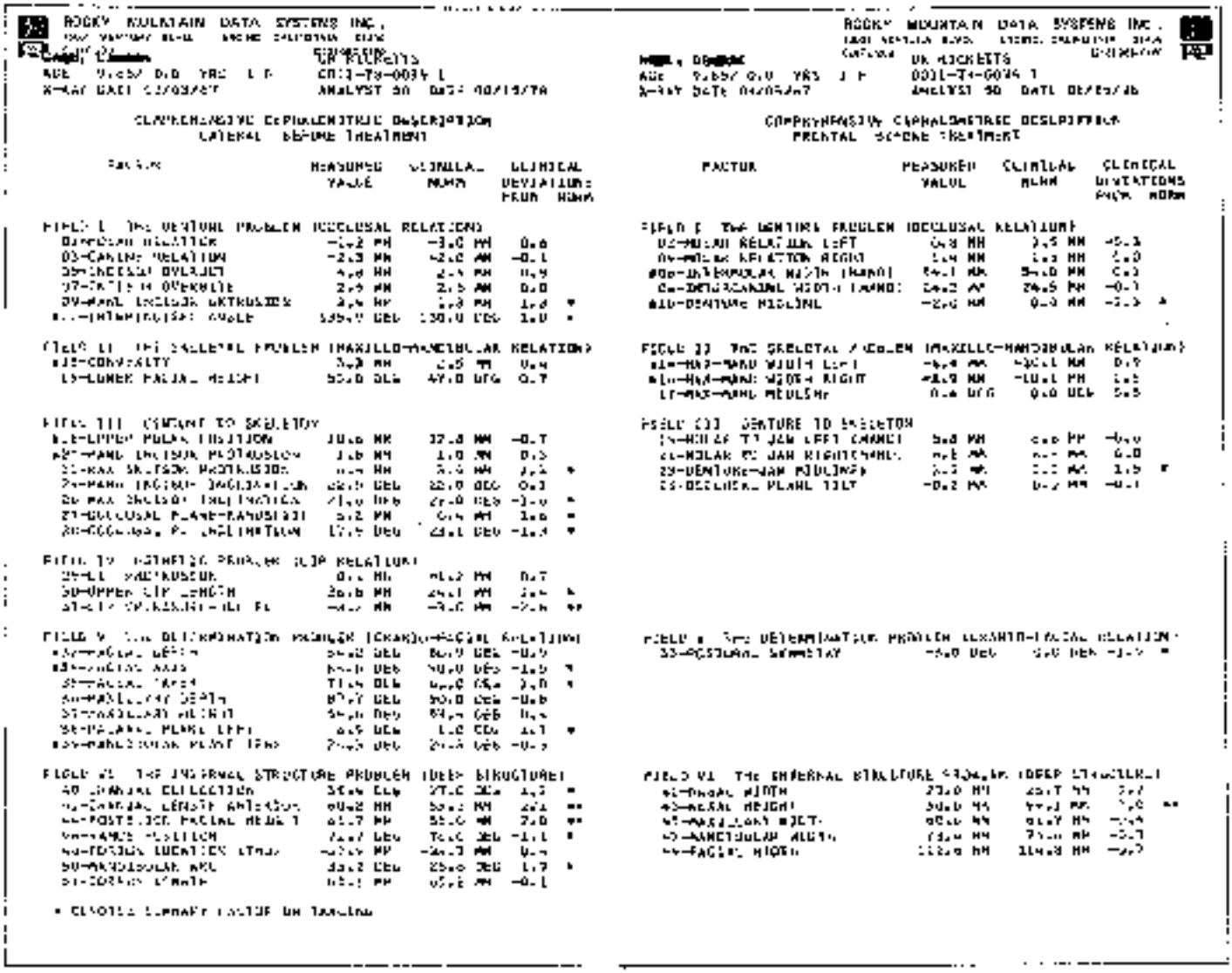
T1 models of D.W.♀ age 9.65 years. Note crowding.

FIG. 11-13-i



T1 D.W. Lateral abstract analysis. Note 5 mm. convexity and 85° Facial Axis. The patient was treated non-extraction and with cervical traction in the upper.

FIG. 11-13-II



ROCKY MOUNTAIN DATA SYSTEMS INC.

UR RICKETTS

CEPHALOMETRIC DESCRIPTION
LATERAL BEFORE TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM	NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)					
01=MOLAR RELATION	-1.2 MM	-3.0 MM	0.8		
03=CANINE RELATION	-2.3 MM	-2.0 MM	-0.1		
05=INCISAL OVERJET	4.9 MM	2.5 MM	11.9		
07=INCISOR OVERBITE	2.5 MM	2.5 MM	0.0		
09=ANAL INCISOR EXTRUSION	3.4 MM	1.3 MM	1.4	*	
11=(INTERMEDIATE) OVALE	535.9 DEG	130.0 DEG	1.0	*	
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)					
13=CONVEXITY	3.3 MM	2.5 MM	0.4		
15=LOWER FACIAL HEIGHT	50.0 DEG	47.0 DEG	0.7		
FIELD III CEMENT TO SKELETON					
17=UPPER MOLAR INCLINATION	30.6 MM	32.8 MM	-0.7		
19=MAND INCISOR PROTRUSION	1.6 MM	1.0 MM	0.5		
21=MAX SKELETON PROTRUSION	n.a MM	3.4 MM	3.4	*	
23=MAND INCISOR INCLINATION	22.0 DEG	22.0 DEG	0.0		
25=MAX SKELETON INCLINATION	21.0 DEG	27.0 DEG	-1.0	*	
27=OCCLUSAL PLANE-RAMUS ANGLE	9.2 MM	9.4 MM	1.6	*	
29=CONDYLE TO ANGLE OF MANDIBLE	17.5 DEG	23.1 DEG	-1.3	*	
FIELD IV GROWTH PROBLEM (LIP RELATION)					
31=LIP PROTRUSION	0.1 MM	-1.2 MM	0.7		
33=UPPER LIP LENGTH	24.6 MM	24.1 MM	1.4	*	
35=LOWER LIP LENGTH	-4.2 MM	-3.0 MM	-2.4	**	
FIELD V THE DENTOFACIAL PROBLEM (CRANIO-FACIAL RELATION)					
37=FACIAL DEPTH	84.2 DEG	80.9 DEG	0.9		
39=FACIAL AXIS	84.6 DEG	90.0 DEG	-1.6	*	
41=FACIAL ANGLE	71.4 DEG	87.8 DEG	3.0	*	
43=MANDIBULAR DEPTH	87.7 DEG	90.0 DEG	-0.6		
45=MANDIBULAR PLANE	34.6 DEG	26.8 DEG	1.1		
47=PALATAL PLANE (FH)	0.5 DEG	1.0 DEG	-0.1	*	
49=MAND-PALAT PLANE (FH)	7.4 DEG	2.4 DEG	0.3		
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)					
51=DENTAL CLASSIFICATION	3.4 CLS	2.7 CLS	1.3	*	
53=CRANIAL LENGTH ANTERIOR	60.2 MM	52.1 MM	2.1	**	
55=POSTERIOR FACIAL HEIGHT	81.7 MM	55.0 MM	2.0	**	
57=RAMUS POSITION	7.7 DEG	7.0 DEG	-1.1	*	
59=FORWARD LOCATION (TMJ)	-4.3 MM	-4.3 MM	0.0		
61=MANDIBULAR ARC	33.2 DEG	25.0 DEG	1.7	*	
63=CONDYLE GROWTH	0.1 MM	0.2 MM	-0.1		

* CLINICAL SIGNIFICANT FACTOR OR TENDENCY

ROCKY MOUNTAIN DATA SYSTEMS INC.

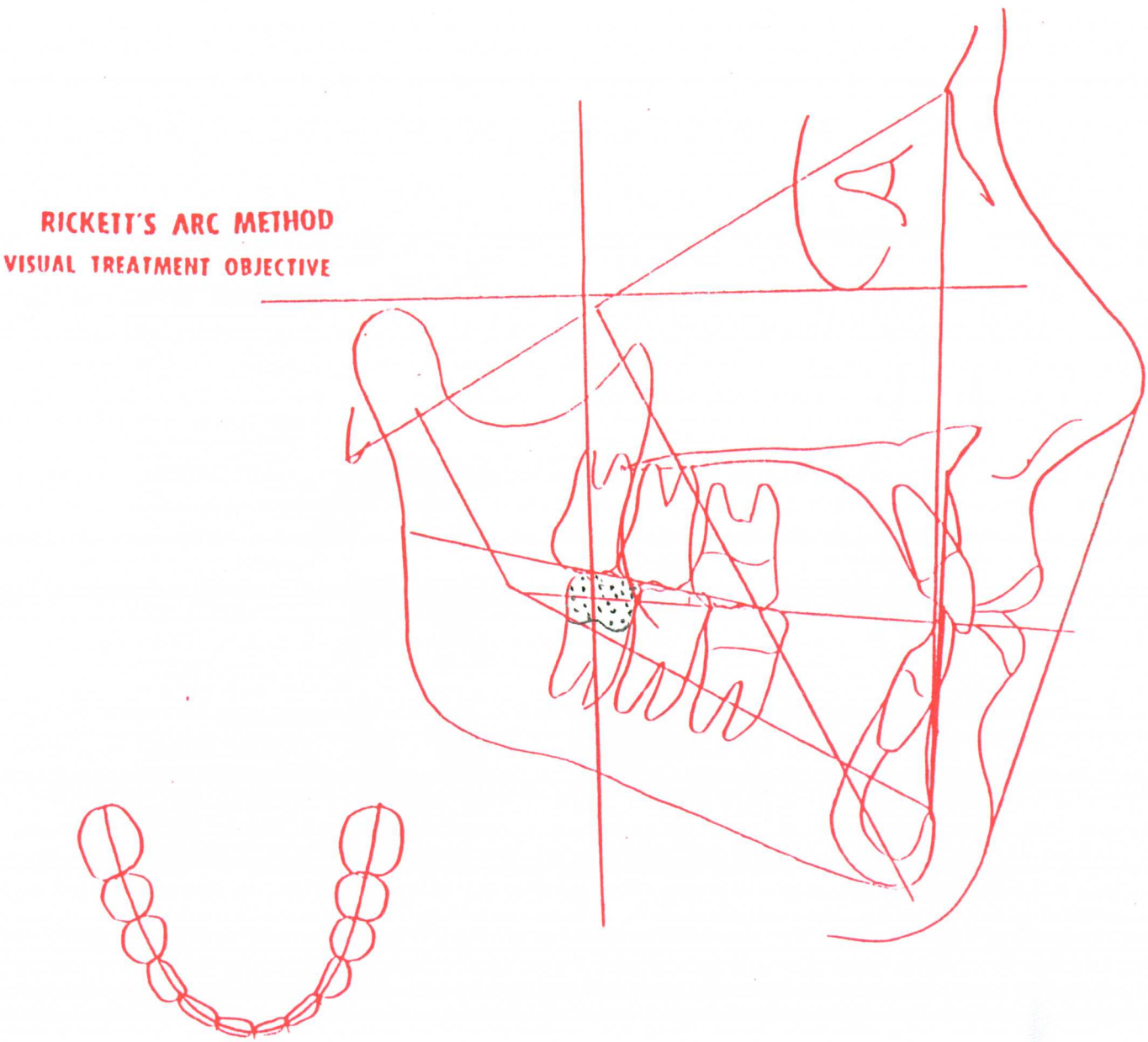
UR RICKETTS

CEPHALOMETRIC DESCRIPTION
FRONTAL SCHEME TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM	NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)					
02=MOLAR RELATION LEFT	0.8 MM	3.5 MM	-5.3		
04=MOLAR RELATION RIGHT	1.4 MM	1.3 MM	1.0		
06=INTERCANINE WIDTH (MAND)	24.1 MM	24.0 MM	0.1		
08=INTERCANINE WIDTH (MAX)	34.2 MM	34.5 MM	-0.1		
10=DENTURE MIDLINE	-2.0 MM	0.0 MM	-2.0	A	
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)					
12=MAX-MAND WIDTH LEFT	-6.4 MM	-10.1 MM	0.9		
14=MAX-MAND WIDTH RIGHT	-8.9 MM	-10.1 MM	1.1		
16=MAX-MAND MIDLINE	0.4 DEG	0.0 DEG	0.5		
FIELD III DENTURE TO SKELETON					
18=MOLAR TO JAW LEFT CHANGE	0.8 MM	0.0 MM	-0.0		
20=MOLAR TO JAW RIGHT CHANGE	n.a MM	0.0 MM	0.0		
22=DENTURE-JAW MIDLINE	2.3 MM	0.0 MM	1.5	*	
24=OCCLUSAL PLANE TILT	-0.2 MM	0.2 MM	-0.1		
FIELD V THE DETERMINATIVE PROBLEM (EXANTO-FACIAL RELATION)					
32=POSTERIOR SYMMETRY	-0.0 DEG	0.0 DEG	-1.2	*	
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)					
42=DENTAL WIDTH	23.0 MM	20.7 MM	2.7		
44=DENTAL HEIGHT	34.0 MM	27.1 MM	5.0	**	
46=PROJECTION OBJECT	60.0 MM	61.7 MM	-0.4		
48=MANDIBULAR ANGLE	23.0 MM	21.0 MM	0.7		
50=FACIAL HEIGHT	113.0 MM	114.8 MM	-0.2		

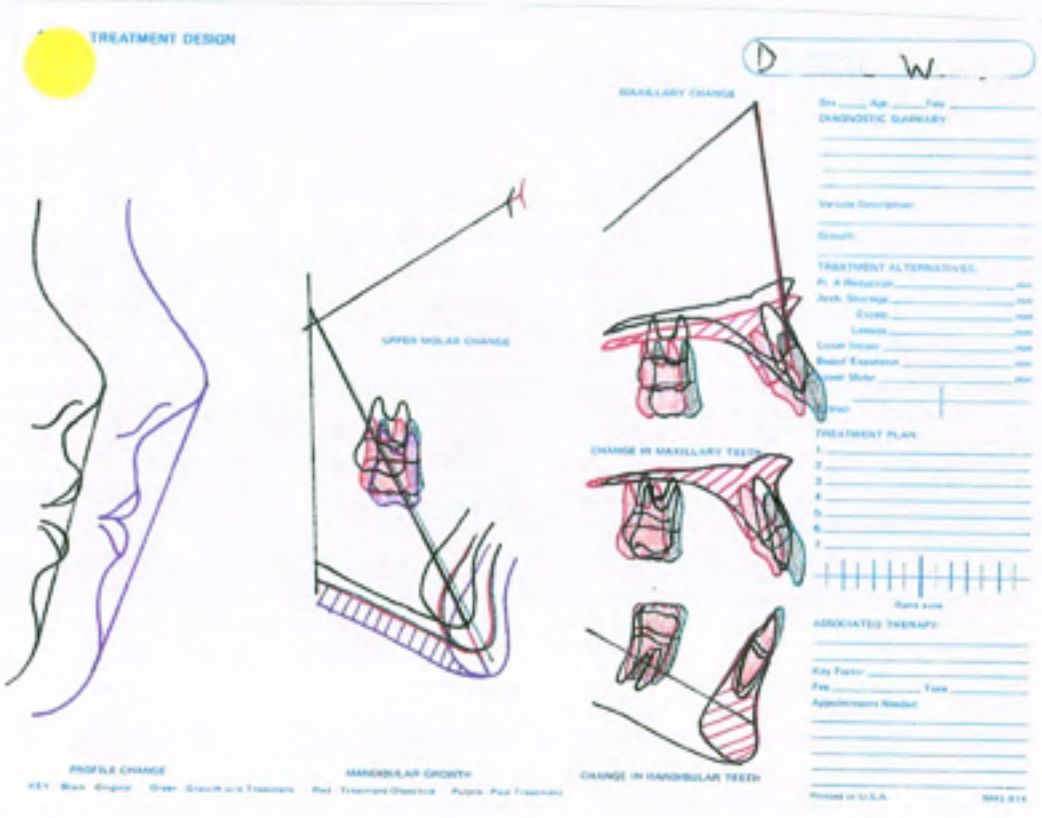
Comprehensive Printout on D.W.
Note stars in the facial parts.

FIG. 11-13-iii



Computer service forecast showing prediction of impacted lower third molars and one mm. convexity.

FIG. 11-13-iv

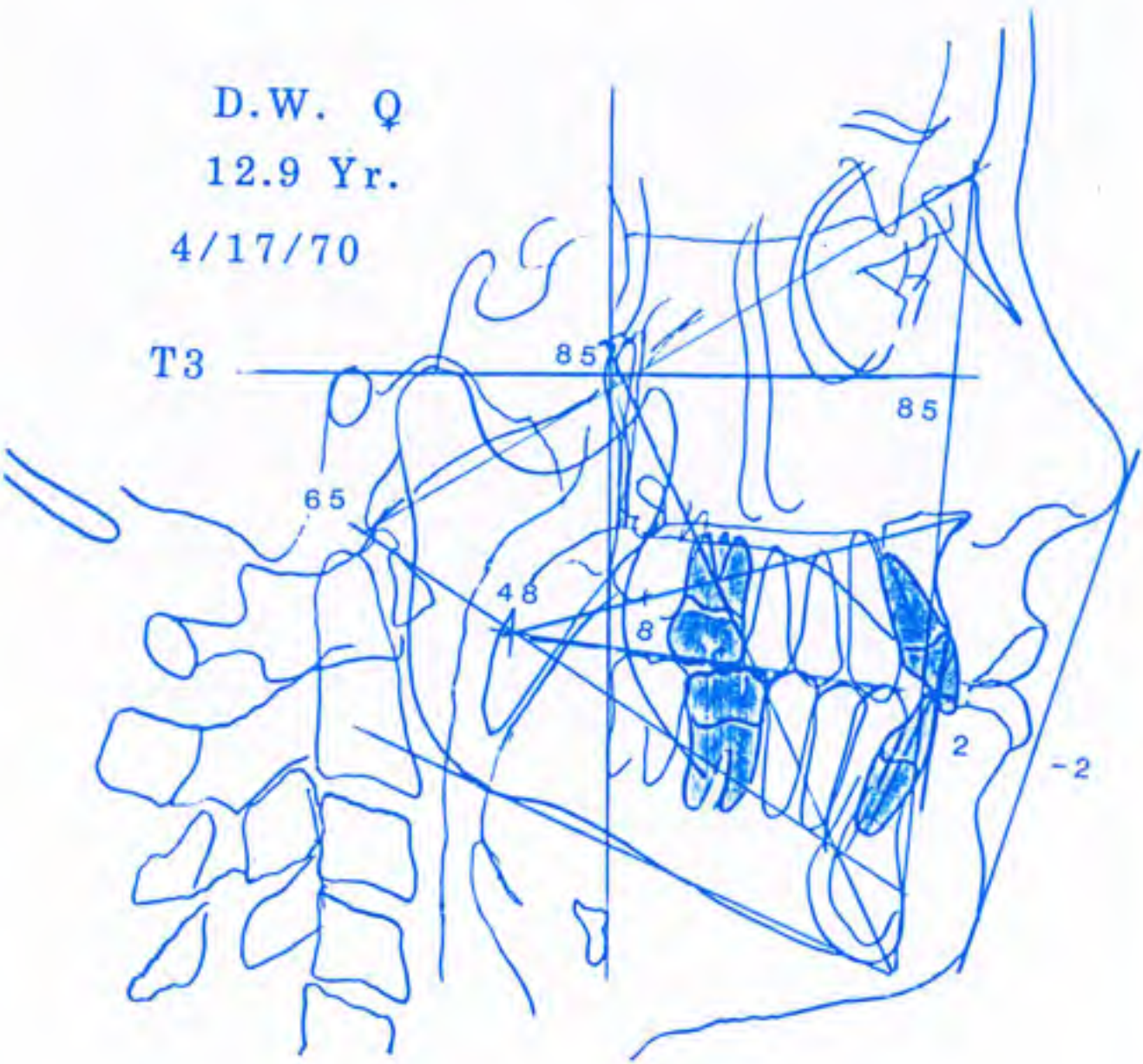


Analysis of the forecast showing need for distal movement of molars and upper arch.

FIG. 11-13-v

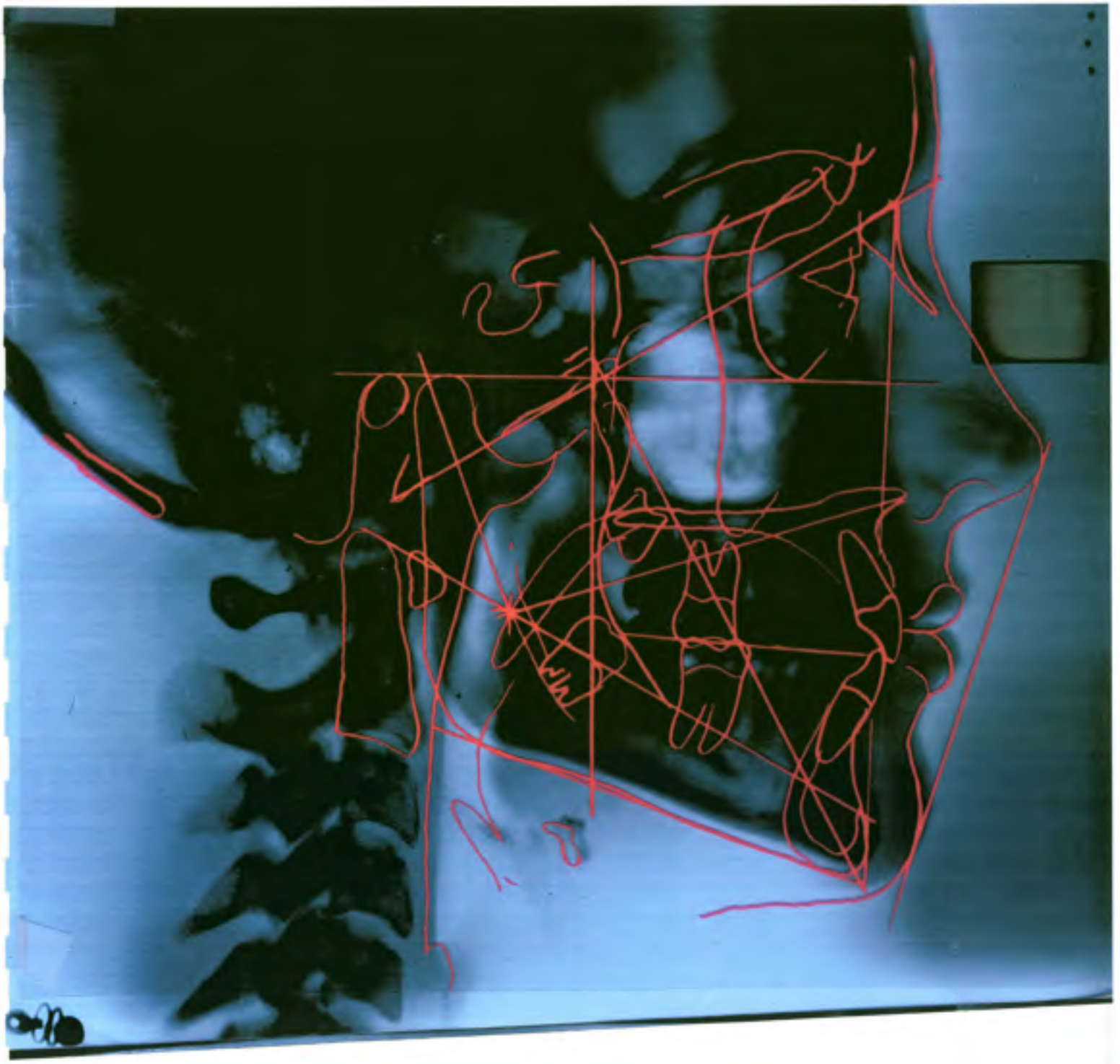
T2 tracing showing distal movement of molars in both arches.

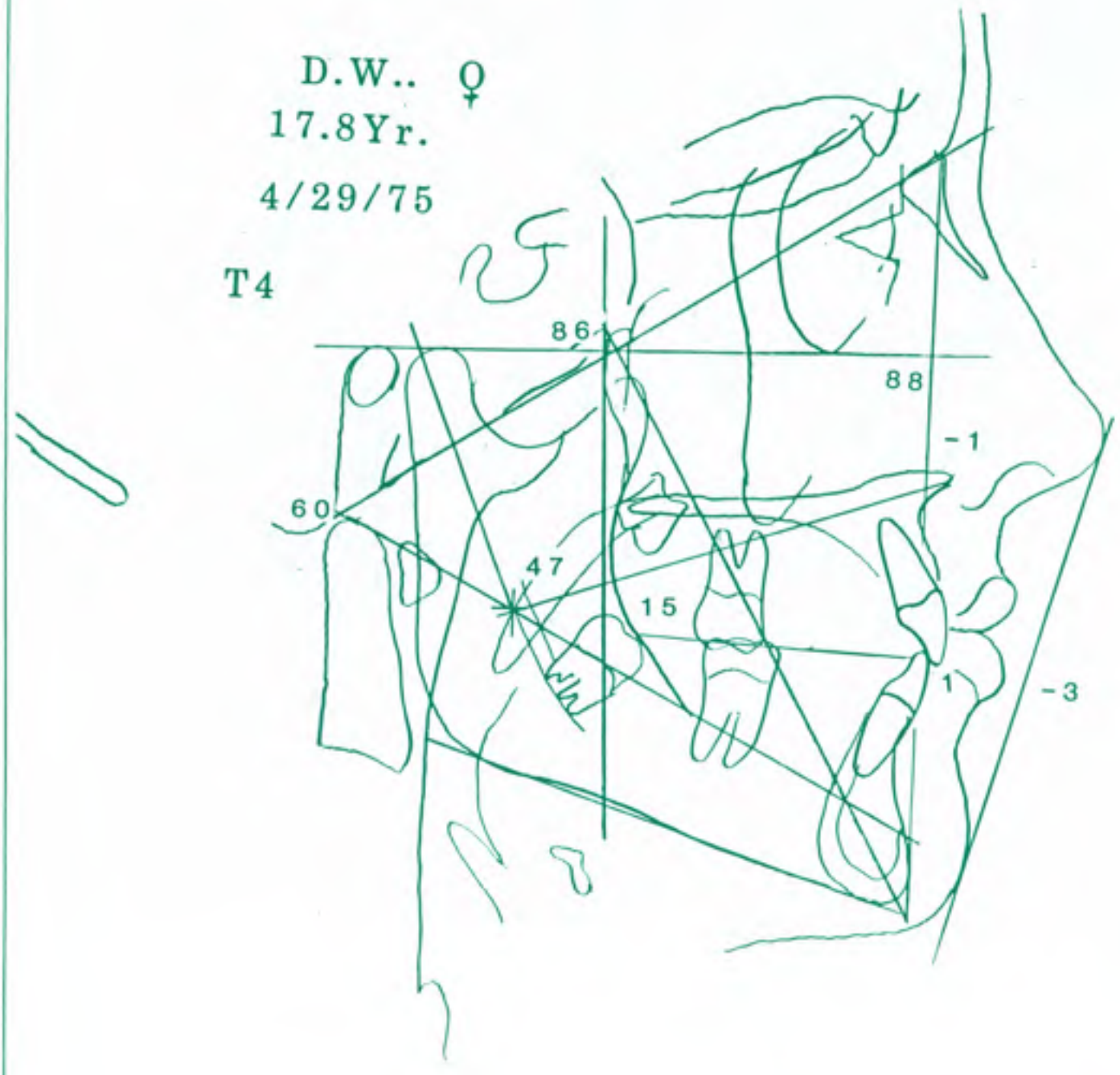
FIG. 11-13-vi



T3 tracing at retention. The lower molar uprighted by distal movement of roots. Note straight profile.

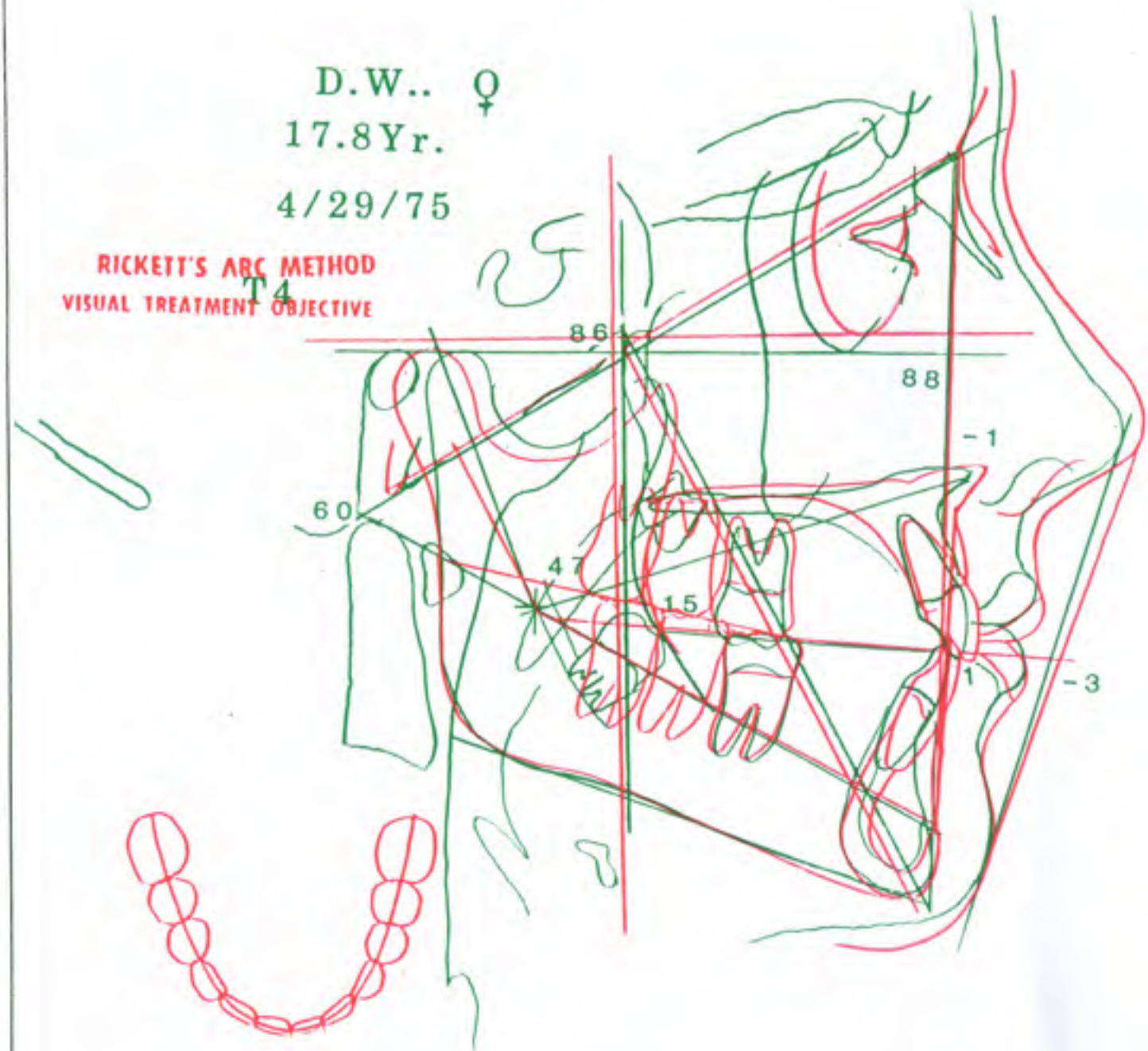
FIG. 11-13-vii





T4 Abstract Analysis. Note slight concavity indicating orthopedics in the midface from theHeadgear. Note impacted lower third molars as predicted.

FIG. 11-13-ix



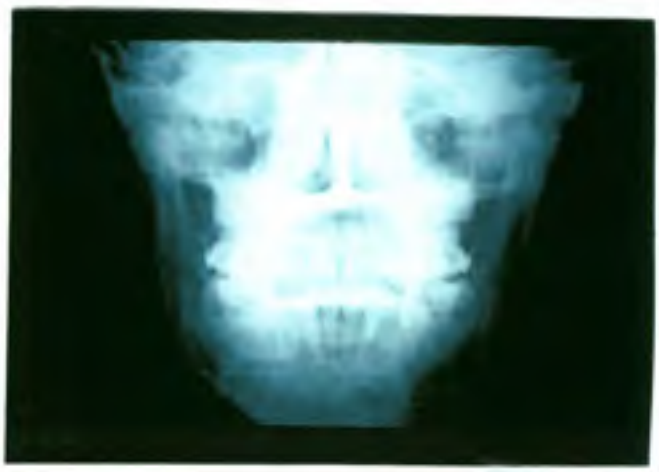
Comparison of the Forecast to the Actual showing the profile reduction with treatment.

FIG. 11-13-x

A

B

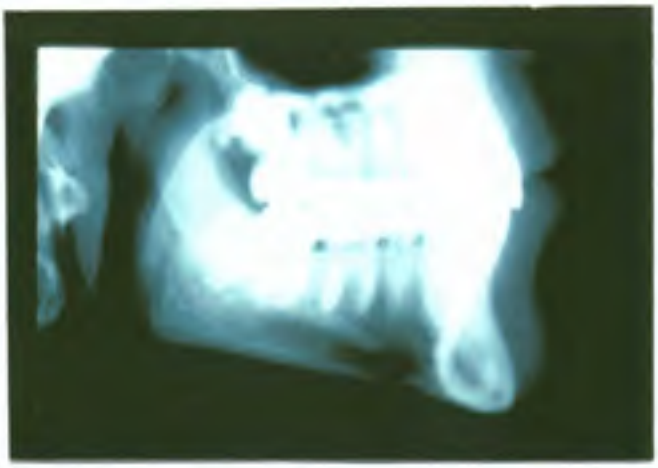
C



D

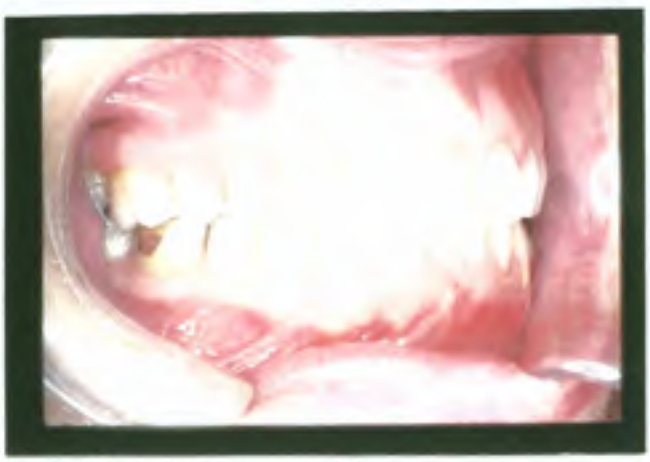
A

B



C

D



Case # 13 - 2

LEGENDS FOR CASE # 13

Case # 13 – 1 D.W. 9 year old female with Class I deep bite and crowded incisors.

A. The patient had thin lips but the face could not take forward expansion.

B. If the second deciduous molar space could be maintained the alignment could be almost satisfied. The caliper shows the canine expansion that occurred naturally with the Utility Arch only on the incisors. The process of canine intrusion by thread ligation is underway.

C. The condition seen in the head plate at this first stage.

D. Utility upper with intrusion and torque with preparation for concatenated wire (or light straight wire by some clinicians).

Case # 13 – 2 D.W.

A. Concatenated wire and then coordinated ideal arches with overtreatment. A fixed $\angle T_4$ retainer and Ricketts upper retainer.

B. Patient at retention and five years later. Note the first molar uprighting by distal movement of roots.

C Patient at removal of retention.

D Patient at age 17 and later at age 30 years.

IV. CLASS I PATIENT INVOLVING THE TRANSVERSE DIMENSION

- Group Seven

Case #14 V.F.9 Class I severe Bilateral Lingual Cross-bite

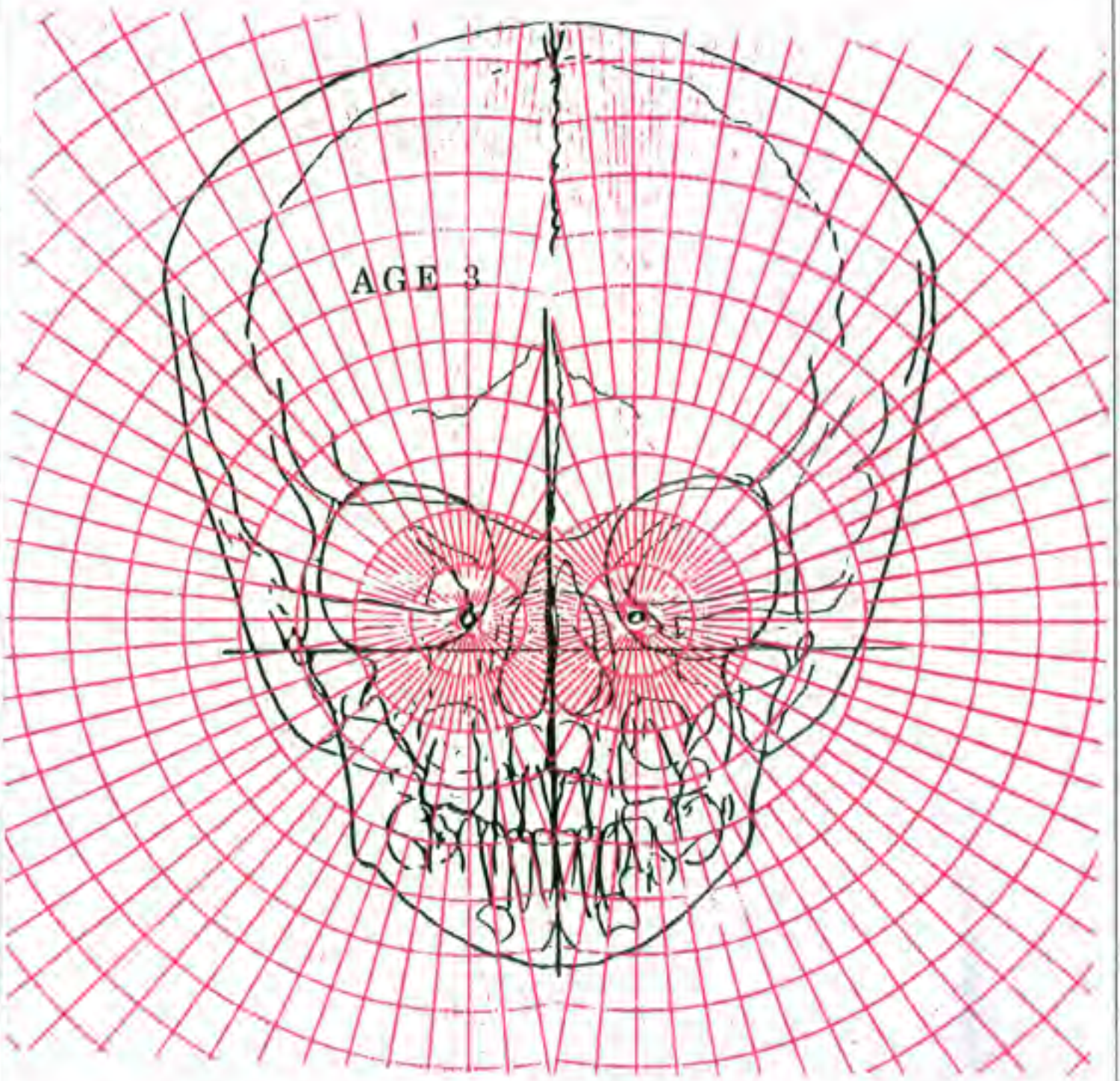
This patient presented at age 7.8 years with complete adenoida airway blockage (**Fig. 11-14 series**). The palate was elevated, a high vault was present and mouth breathing was continuous. In contrast to the mean of a normal outside molar width (at the buccal) in the frontal head film at 59.0 mm. (in females) this patient was 46 mm. (or 13 mm. too narrow). Immediate attention was thought to be indicated.

Treatment

The first step was the correction of the respiratory obstruction. Adenoidectomy was performed. Step two, was the placement and activation of a fixed jackscrew rapid palatal expansion appliance. This appliance extruded the buccal teeth and rotated the mandible. Step three, the palate also needed to be tipped downward anteriorly for the sake of facial harmony. The cysjunction was therefore followed by cervical head gear on the upper first molars.

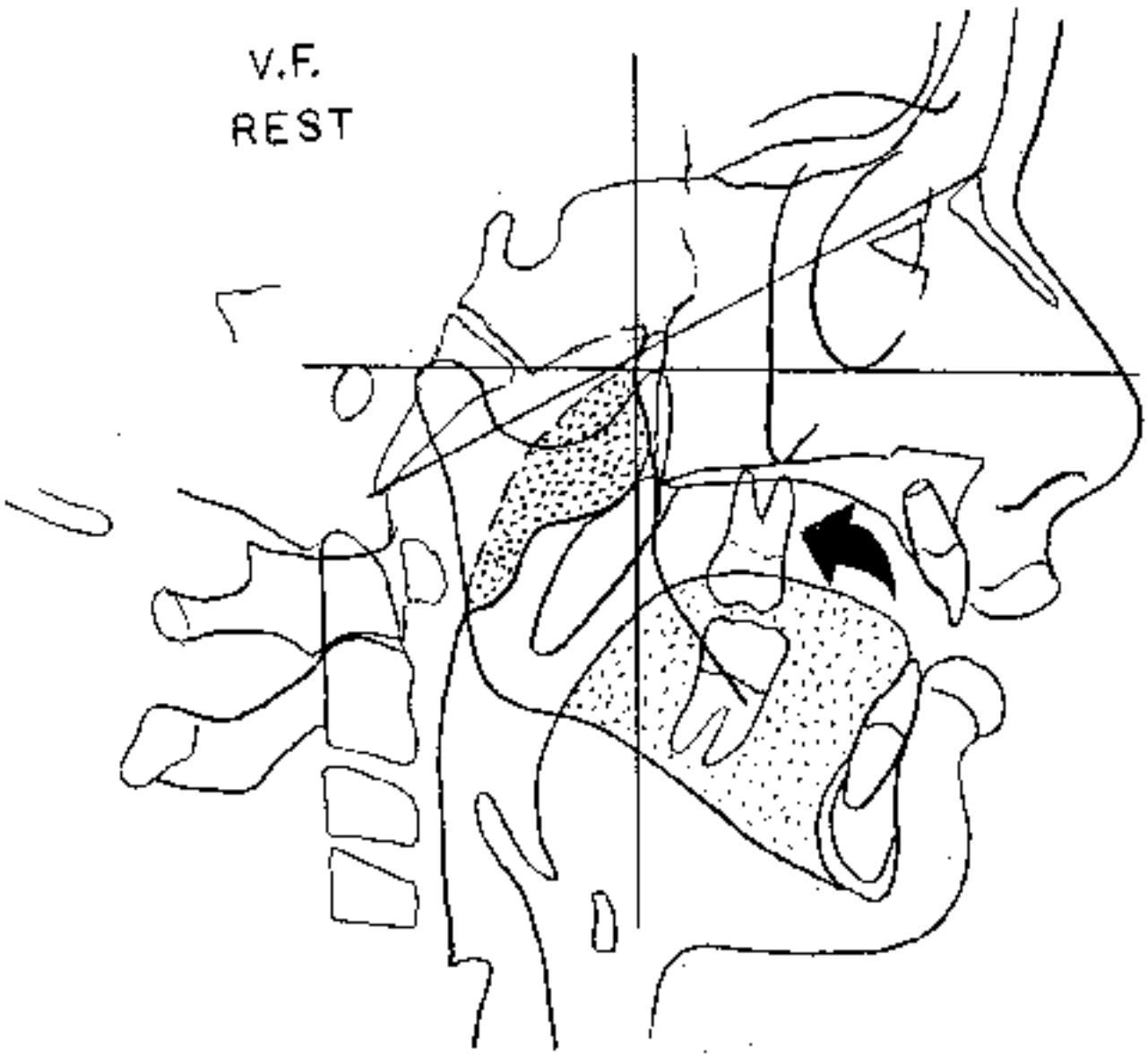
The tipping of the palate then produced an incisor interference. For Step four, a utility arch was placed on the lower to intrude the lower incisors and to open arch length and also to control lower molar width. This produced distal movement on the lower molar. The patient then benefited from intermaxillary elastics.

By age 10, structural and dental changes normalized the face in three dimensions. Intermaxillary elastics were employed for finishing. The patient was transferred due to family changes during the finishing stage.



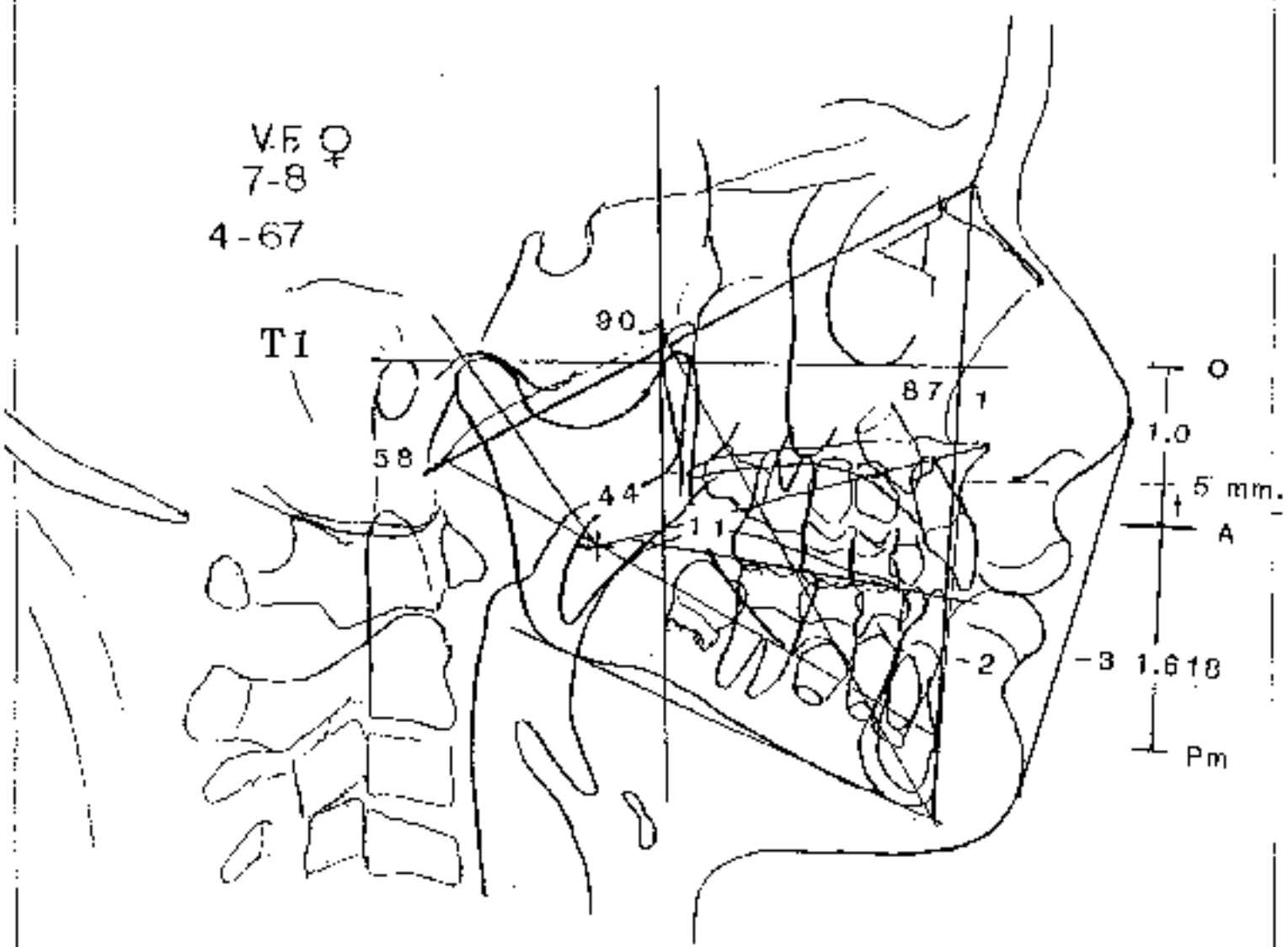
Growth in the Frontal is bipolar due to two nerve and blood supplies. This is well to keep in mind in dealing with the transverse dimension.

FIG. 11-14-i



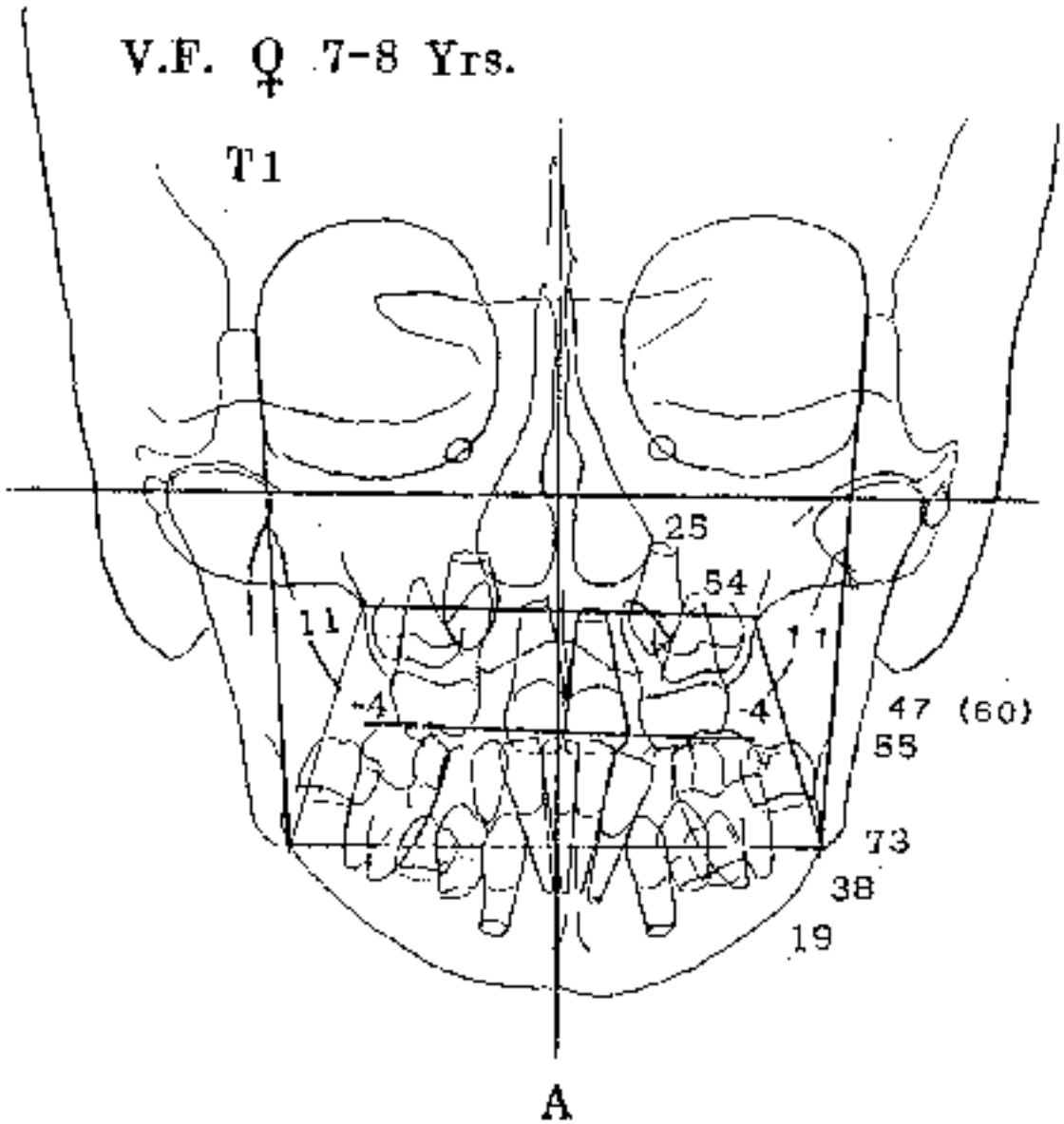
This seven year old patient could not breath through the nose. At rest the mouth is open for an oral air passage. Severe bilateral lingual cross-bite was present together with a high vault in the palate.

FIG. 11-14-ii



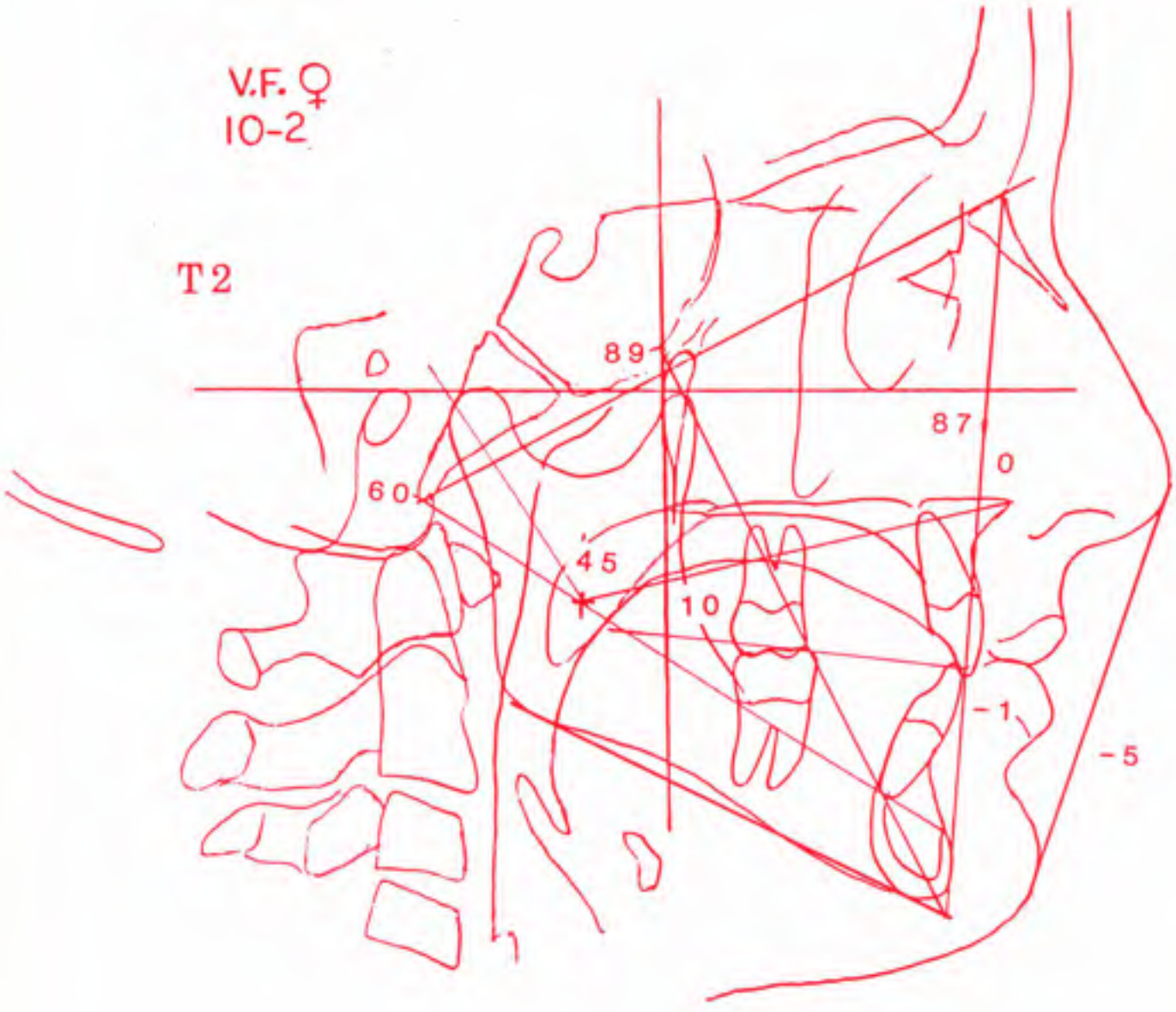
Tracing of V.F. age 7.8 with abstract analysis. The mandible is good but the maxilla is high. The Divine Proportion should be 1.0 to 1.618 from Obitali to A to Pm. She is 5 mm. too high at point A as seen at arrow.

FIG. 11-14-iii



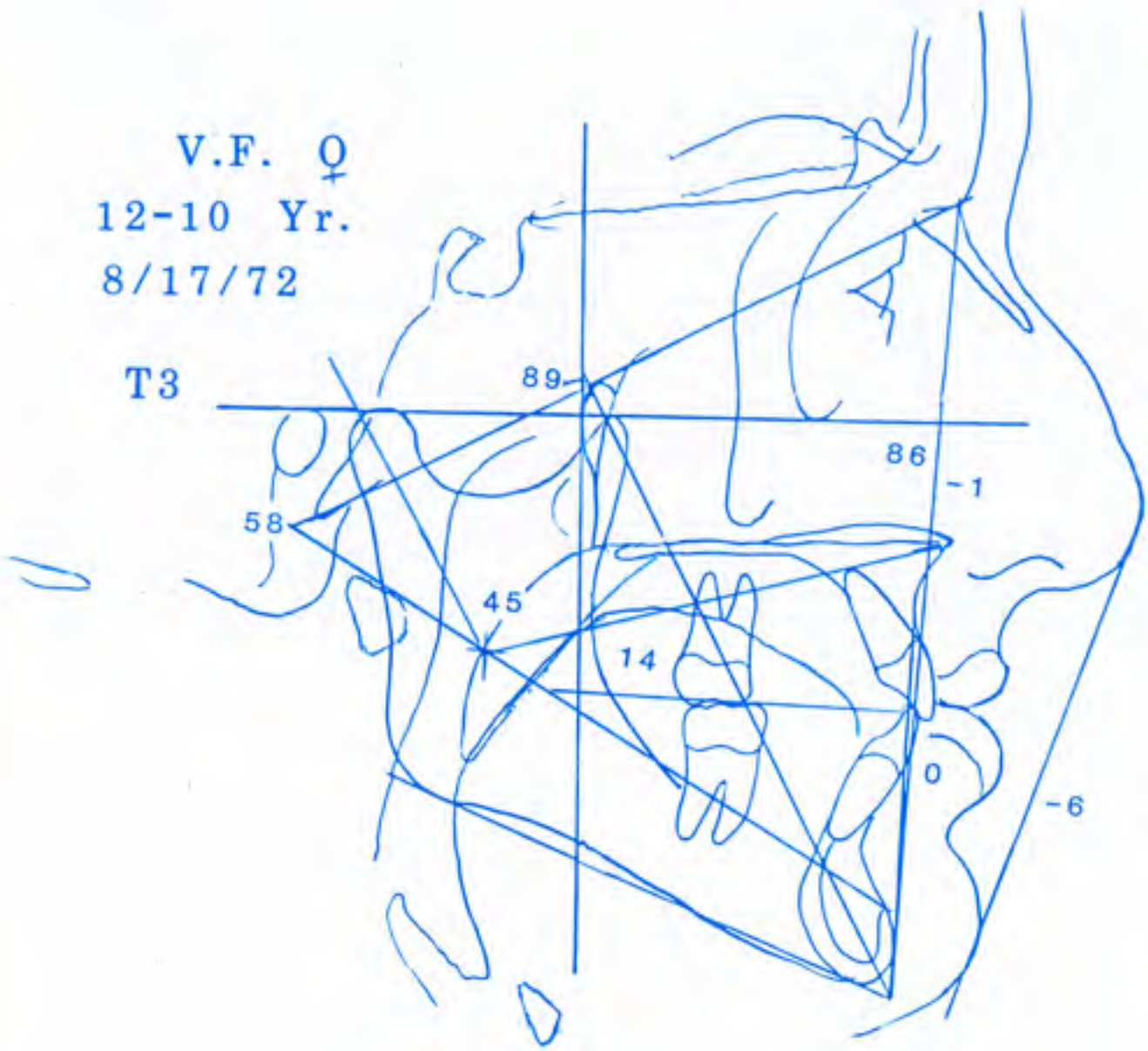
T1 for V.F. shows narrow upper arch (47 mm.) Upper molar width at the buccal in females has a mean of 60 mm. in the head film, and the maxilla should be 60 mm. at age 8 years.

FIG. 11-14-iv



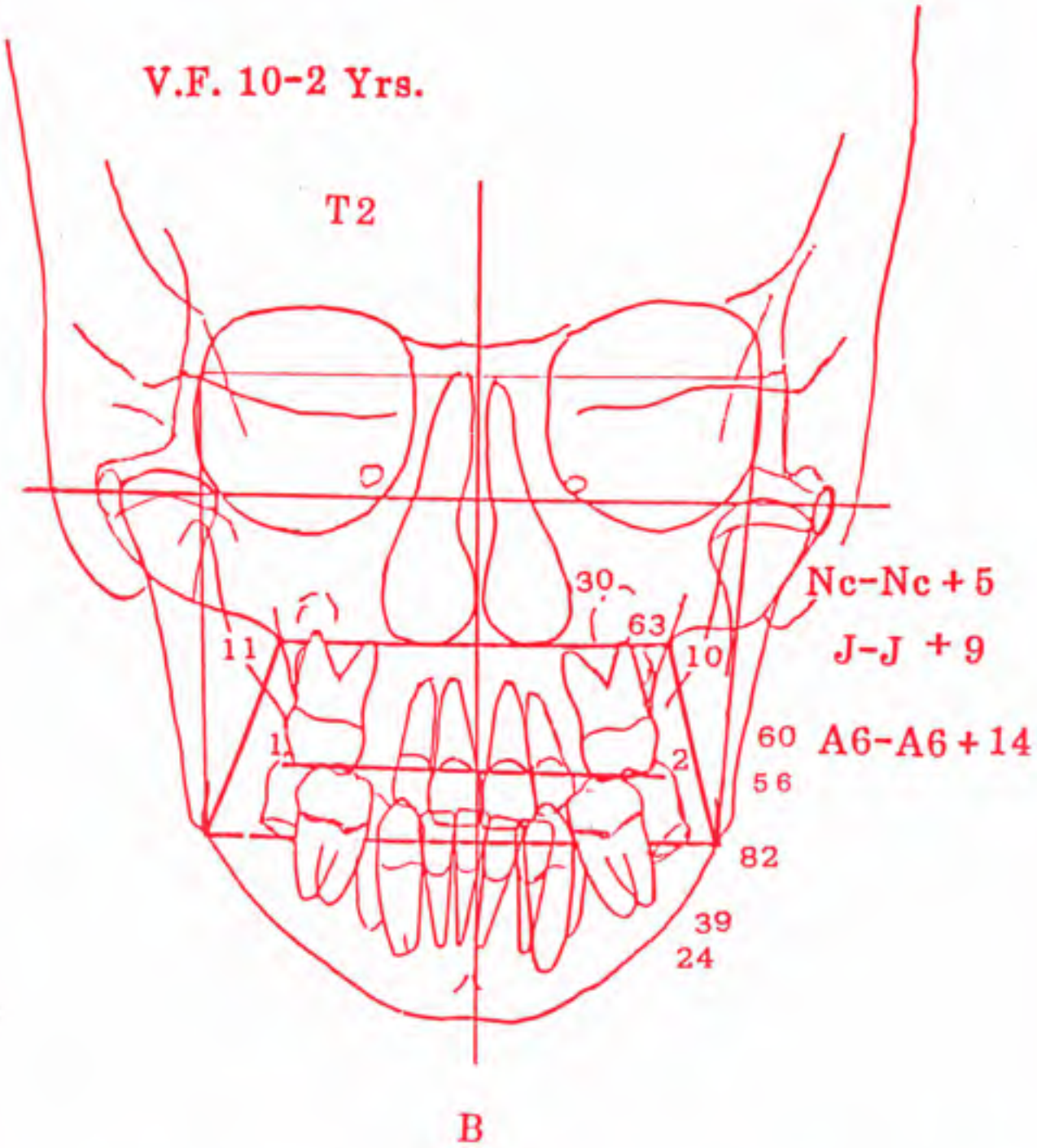
Treatment for V.F. was removal of adenoid palatal dysfunction and cervical traction face bow for palatal management.

FIG. 11-14-v



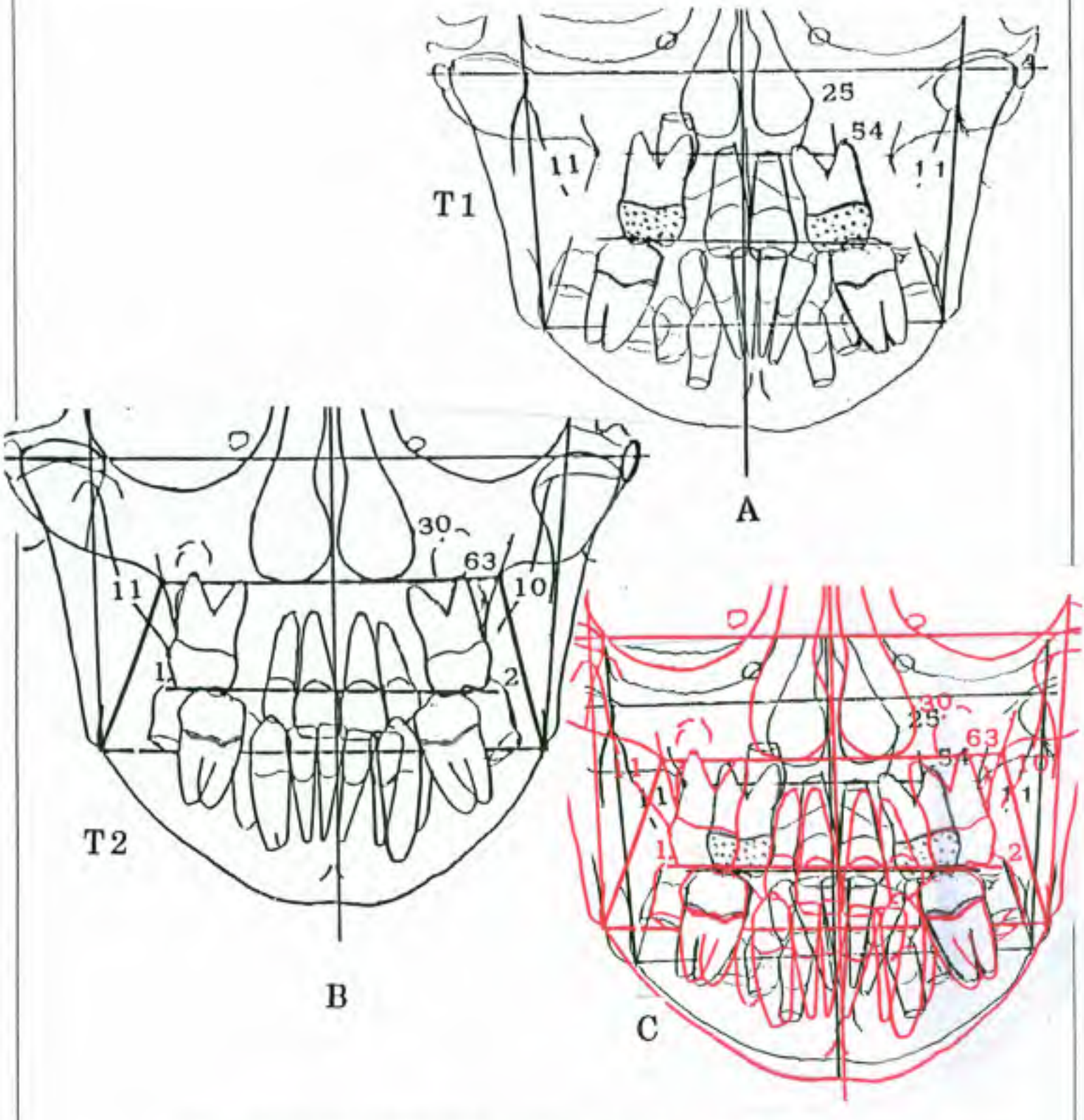
T3 for V.F. during finishing mechanics at almost age 13. Note the good proportions but slight concavity.

FIG. 11-14-vi



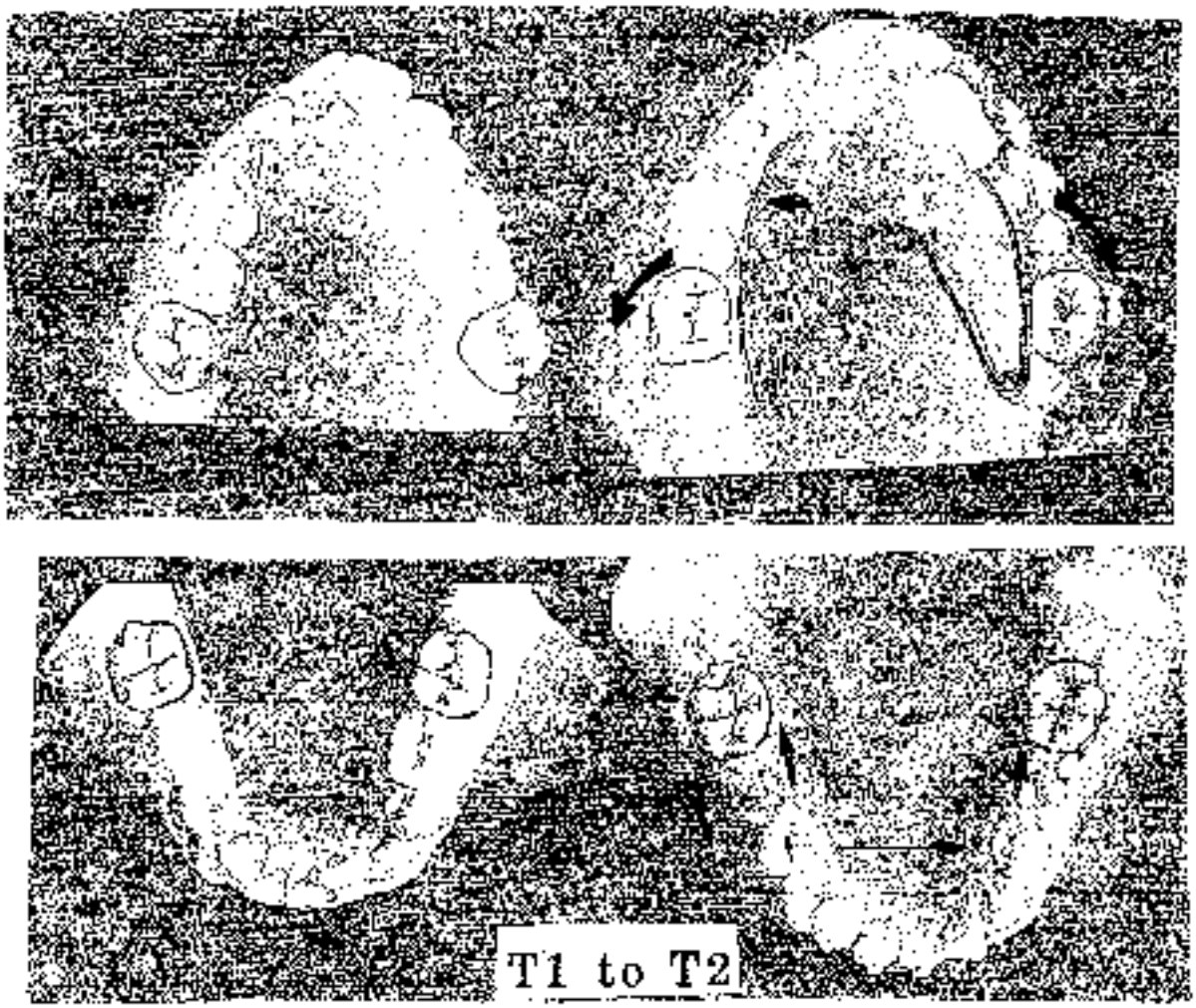
T2 Frontal tracing and abstract analysis on V.F. age 10 years. Note increase in J points of 9 mm., increase of nasal width of 5 mm. and 14 mm. expansion.

FIG. 11-14-vii



Comparison of T1 and T2 for V.F. superimposed on the occlusal plane (red). Molar width at the buccal of the upper molars is now 61 mm. or normal.

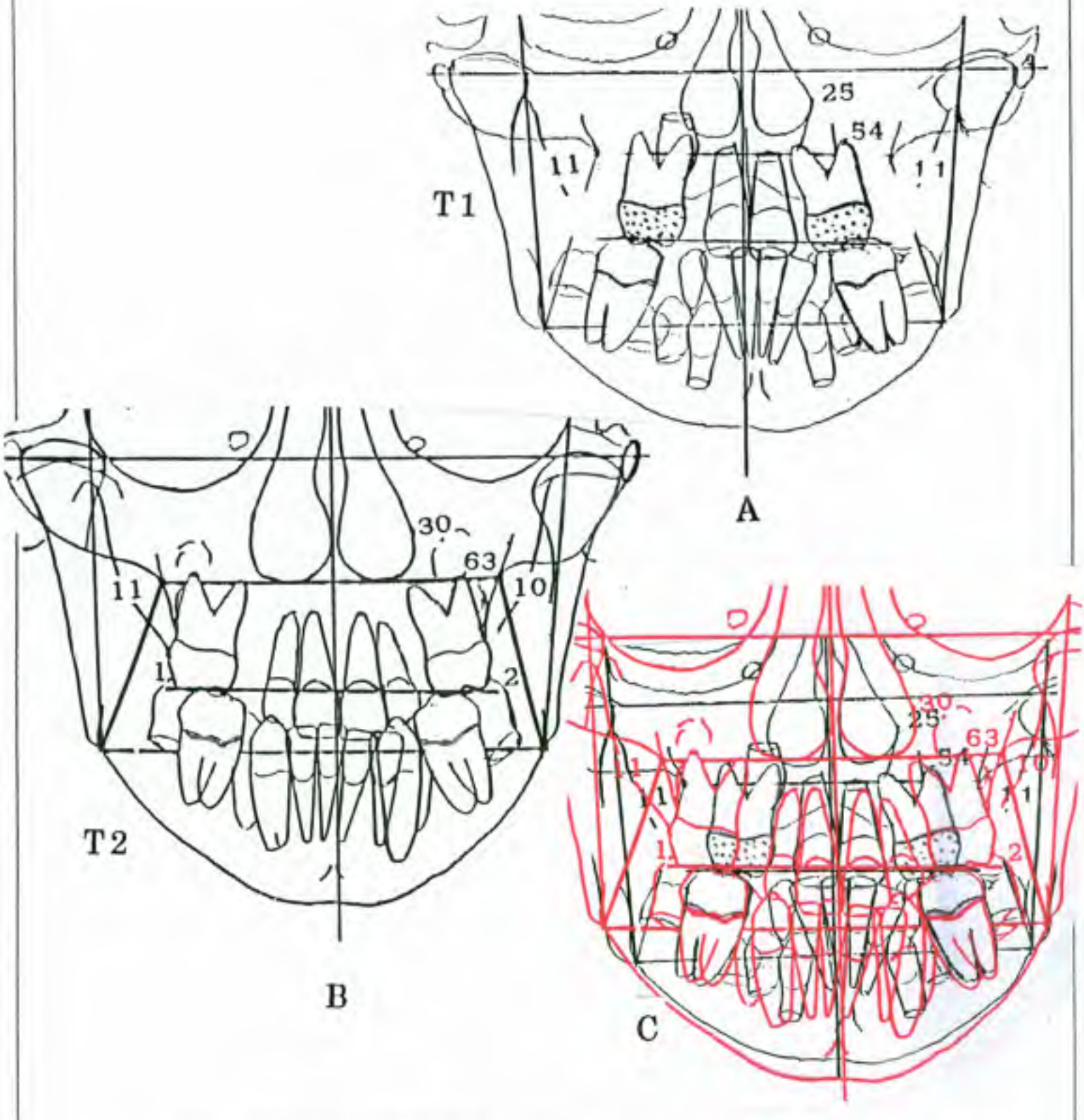
FIG. 11-14-viii



D.C.M. ♂ 10.88 Yr. 6/27/78

A different patient, a male age 10.8 years with cross-bite but treated with an upper quad helix and lower utility arch followed by an upper utility for incisor alignment. Note the free arch change in the lower.

FIG. 11-14-ix

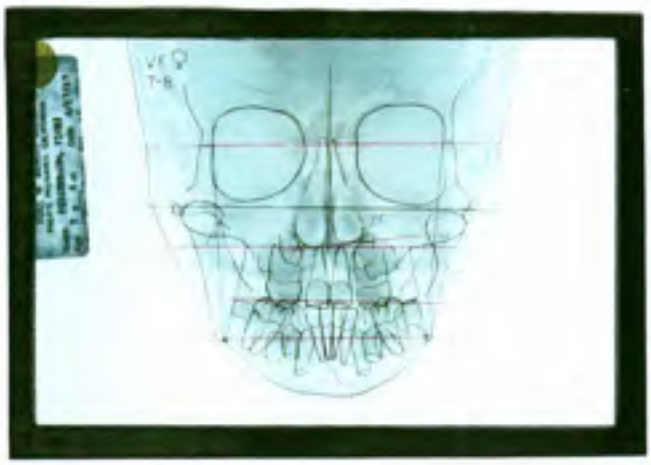


Comparison of T1 and T2 for V.F. superimposed on the occlusal plane (red). Molar width at the buccal of the upper molars is now 61 mm. or normal.

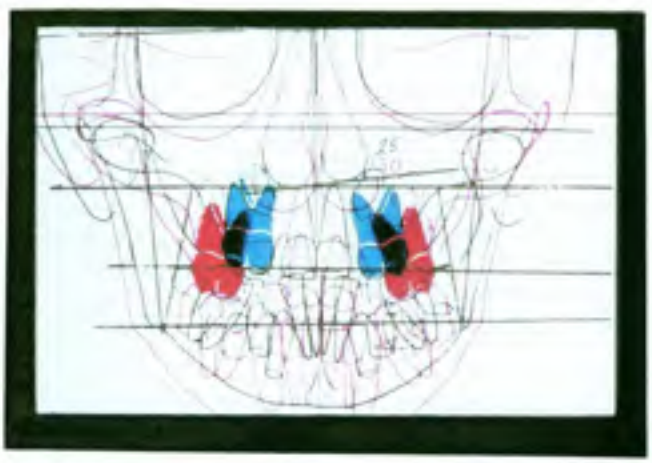
FIG. 11-14-viii

A

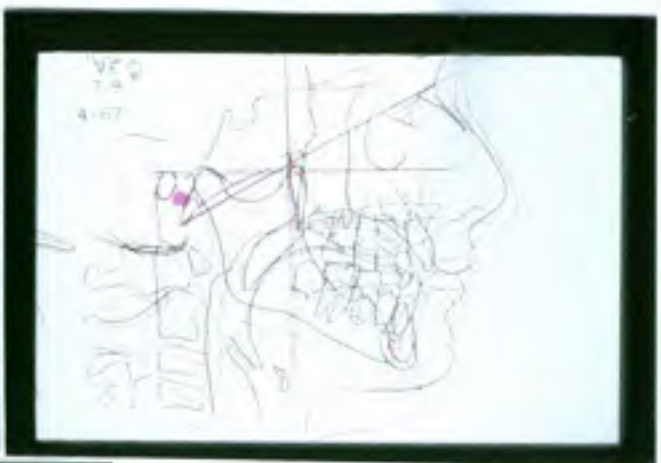
B



C



D



Case # 14 - 1

Case # 14 V.F. age 7.9

A. Lateral head film shows complete blockage of nasal cavity by adenoid. The first step was adenoidectomy and the second was palatal disjunction.

B. The frontal tracing superimposed over the head films at age 7.9 and 10.2. Note the expansion in a bilateral lingual cross-bite condition. The expansion was followed with cervical traction.

C. The expansion is outward but also almost equally downward. The buccal occlusion on the left side developed nicely with no further aid.

D. The condition in lateral at age 10 showing very slight opening of the Facial Axis to that point.

Case #15 R.B. ♀ Class I Crowded with Functional Mandibular Deviation

This female patient was seen in the early mixed dentition development. She presented with severe upper incisor rotation, a frenum problem and lingually displaced lower lateral incisors **(Fig. 11-15 series)**. The wear on the deciduous canines was asymmetrical and the condition on the right side suggested an impending cross bite. The "nasal passages" appeared to be good. The forecast suggested that space would be available for all third molars without premolar extraction. Again the three choices to observe, serially extract or expand were available! The patient was a beautiful candidate for the quad helix.

Treatment

A two phase procedure was contracted. The first step was a fully expanded quad helix to the first permanent molar with contact on the deciduous molars at age 7. This was adjusted intraorally. The palate was widened and actually the suture was opened with the quad helix. As a second step the upper centrals were moved together with a crossed T anterior section with .016^2 wire. No other appliances were employed for the next three years. Normal developmental factors were permitted to exercise the potential.

At age 10 upper and lower utility arches were placed to preserve the second deciduous molar space (mean ± 2.8 mm. each side). This permitted the distal drift of premolars and the permanent canines.

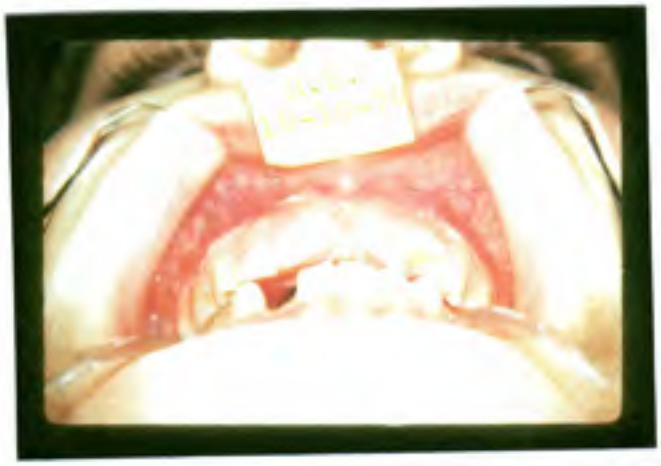
Later, full appliances were placed for accomplishing overtreatment and details.

The third molars erupted as predicted with the computer forecast.

Comments:

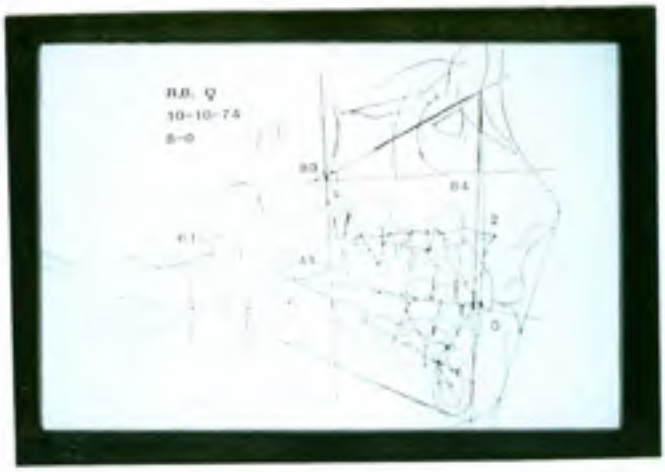
This patient can be compared to a Class I crowded condition in Case # 13. The headgear was employed in that patient but the quad helix was employed in Case # 15. It could also be compared to Case # 14 which was expanded with a jackscrew.

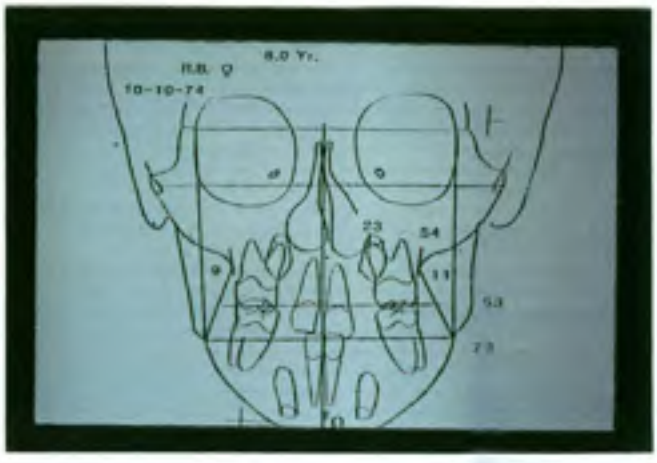
A



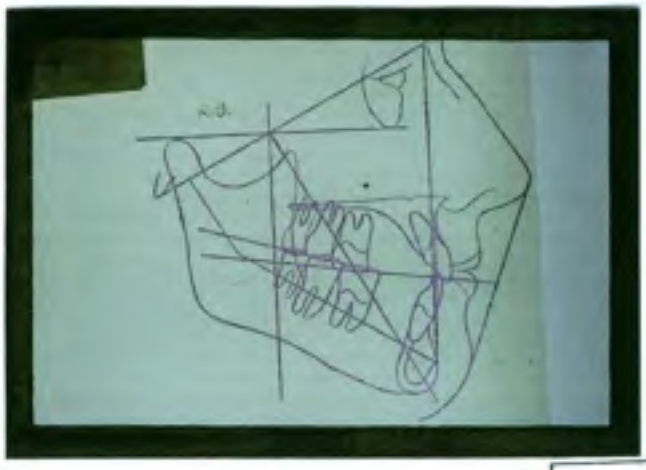
B

C





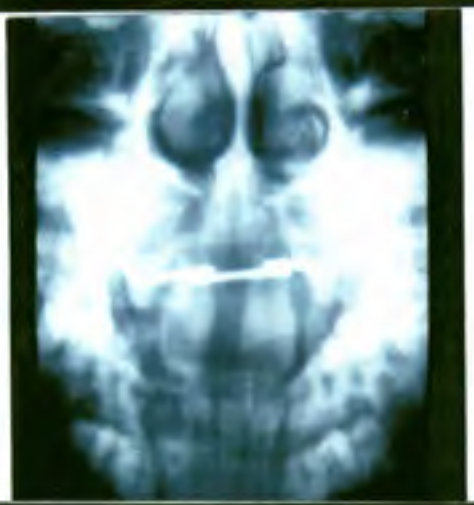
D



Case # 15 - 1

A

B

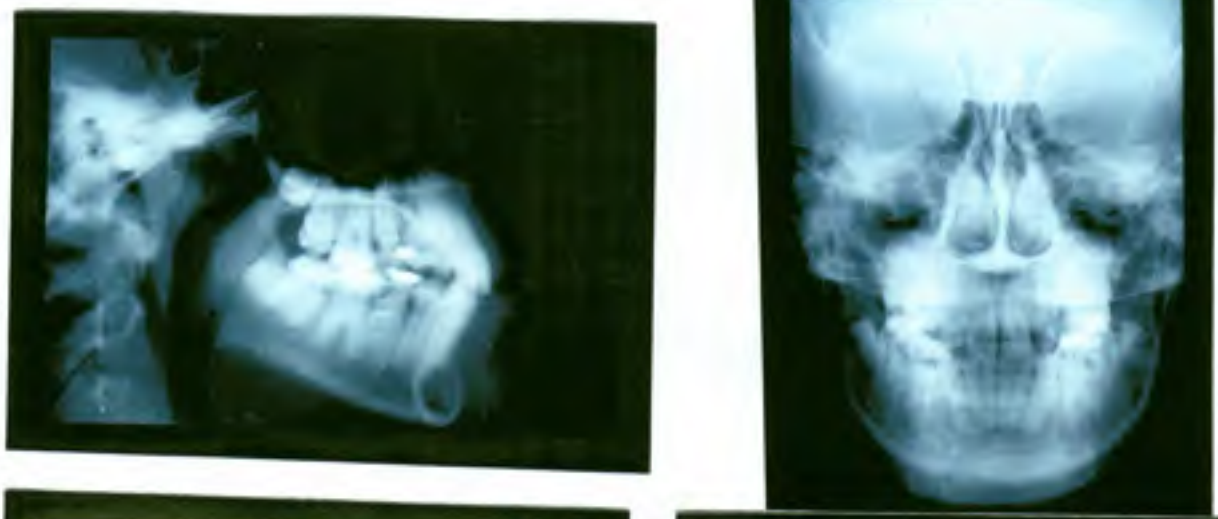


C

D

Case # 15 - 2

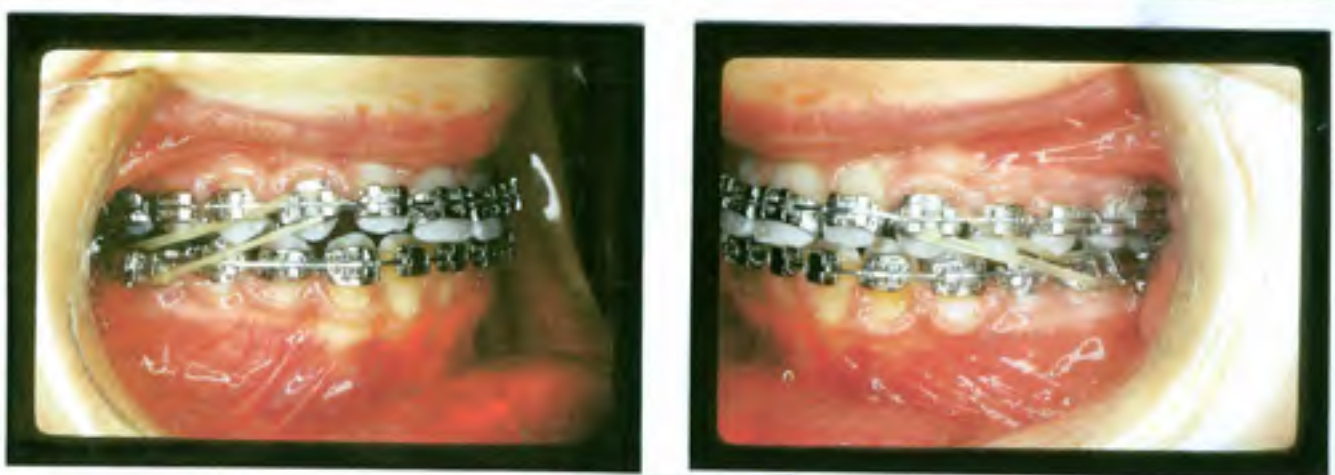
A



B

C

D



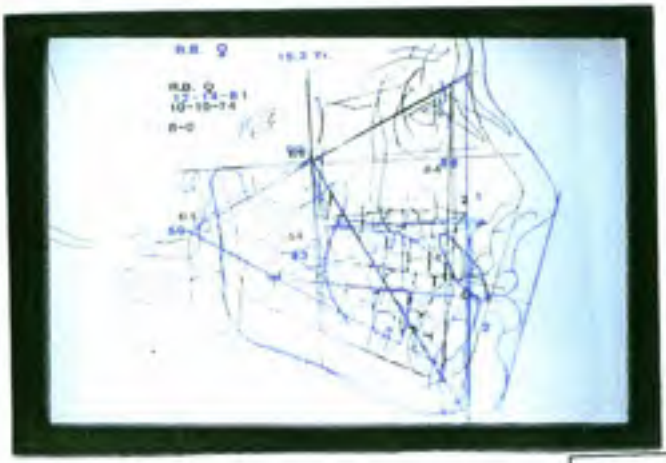
Case # 15 - 3

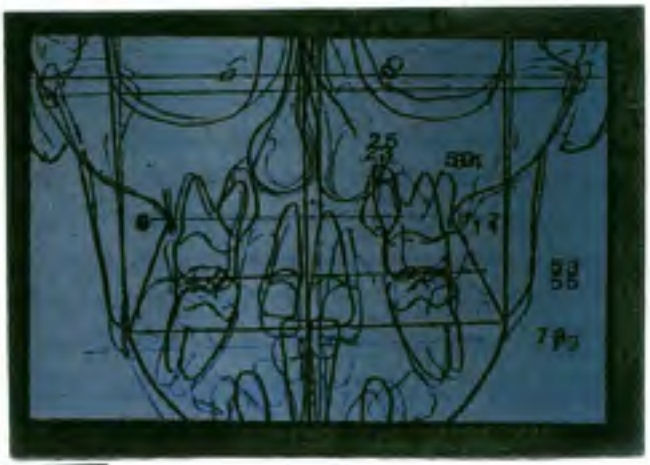
A

B

C

D





Case # 15 - 4

A

B

C

D

LEGENDS FOR CASE # 15

Case # 15 – 1

This Class I 8 year old female at the early mixed dentition was crowded in both arches.

A. The child had a broad smile which helped with the decision to expand instead of serially extract.
B. Note the asymmetric wear of the deciduous canines and first deciduous molars.
C. The face is mesognathic but the molars were narrow with cross-bite tendency.
D. The computer long range forecast suggesting space for third molars with "ideal" results. The VTO-VTG with analysis of the forecast as the basis for mechanical plans. The quad helix was planned as the first phase treatment.

Case # 15 – 2

A. The results of four months of quad helix with overtreatment. Note the diastema suggesting a palatal separation.
B. The frontal head film showing the widened mid-maxillary suture. A crossed T loop gently closed the space while the quad helix was an expansion retainer.
C. After removal of the quad helix showing intentional overtreatment. One year later showing eruption of the upper lateral incisors and buccal occlusion influences.

Case # 15 – 3

A. Observation head plates with check of midlines.

B. Utility arches were placed to preserve the "E" space, align the incisors and preserve the normal overbite.

C. The premolars are drifting distally to create canine space.

D. Ideal arches are placed with overtreatment.

Case # 15 - 4

A. Overtreatment is accomplished on the right side but perhaps insufficient on the left.

B. Lower premolar to premolar fixed retainer and upper Ricketts.

C. Head film at age 15 with $\overline{4\,1\,4}$ in place until third molars erupt. Note the pleasing skeletal relation but lower lip is thicker than the upper lip.

D. The Facial Axis (Fx) has improved from 89° to 90°. The width increase was greater on the right side. The maxilla was widened 5 mm. and the upper molars over widened 6 mm.

Case # 15 – 5

A. Retention was continued on the upper for 1 year but on the lower, was employed until the lower third molars had erupted.

B. Condition of occlusion at age 18.

C. Headfilms at age 18 showing balance and symmetry.

D. Facial photographs with beautified face and full lower lip.

V. VARIETIES IN SERIAL EXTRACTION - *Group Eight*

Case #16 L.C.: Severe Crowding with requests for Non Visible Appliances

This female patient was examined at age 7 (**Fig. 11-16 series**). Because the child had a lucrative modeling contract, the mother was furiously against appliances that would "show" or restrict the child's career.

Forecasts suggested that ultimately non extraction would be successful. However, for rapid correction and esthetics, extraction of deciduous canines would facilitate esthetics for the present by allowing the incisors to self align. Later an invisible quad helix was recommended to be followed with Crickett appliances.

Treatment

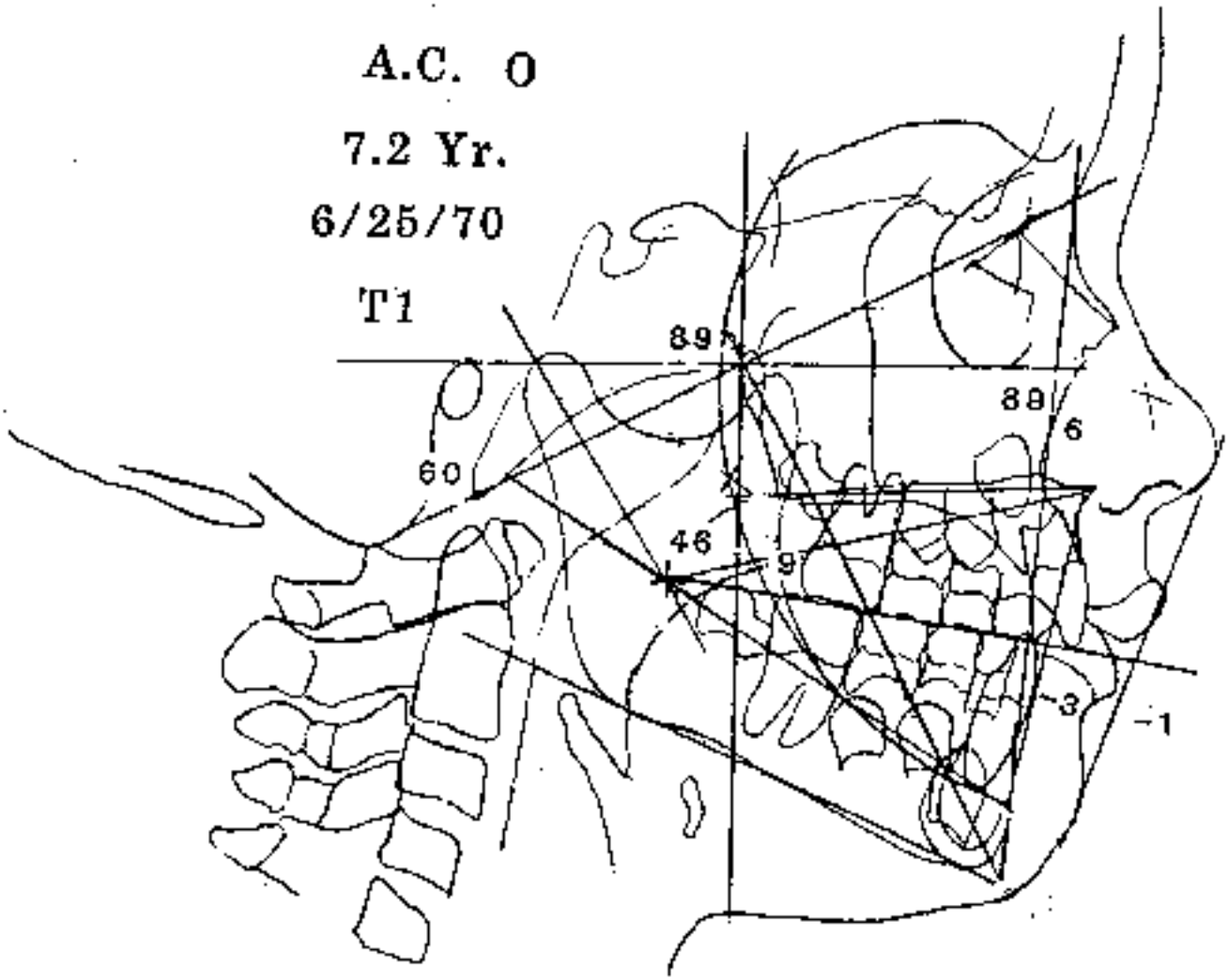
The deciduous canines were removed and the lateral and central incisors were freed to adjust themselves. The slight midline problem corrected naturally. In 3 years the premolars had erupted but a shortage of space was present in all four canine areas. Still the parent insisted that no visible appliances be used.

For the second phase, the decision was made to place a quad helix on the upper and a Crickett on the lower for expansion. The quad helix after expansion success was replaced by the removable Crickett. Excessive space to facilitate rotations was created.

For the third phase, **a positioner was placed.** The result was more than pleasing to the patient and parent.

A.C. at age 7.2 years. Note protruding upper Lip and narrow mouth.

FIG. 11-16-i



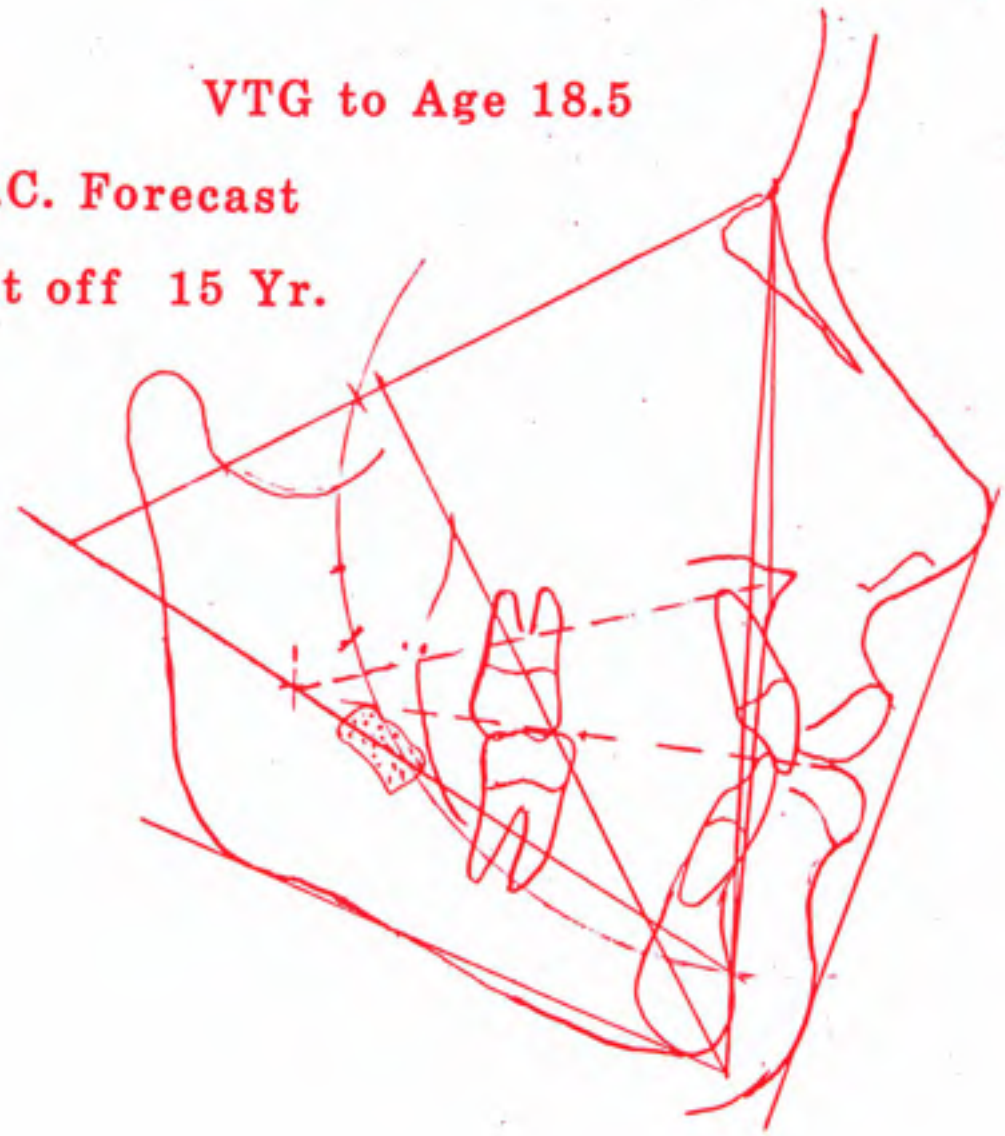
T1 Lateral with Abstract Analysis – moderate convexity. Note Class II Division 2 developing. Serial Extraction was performed.

FIG. 11-16-ii

VTG to Age 18.5

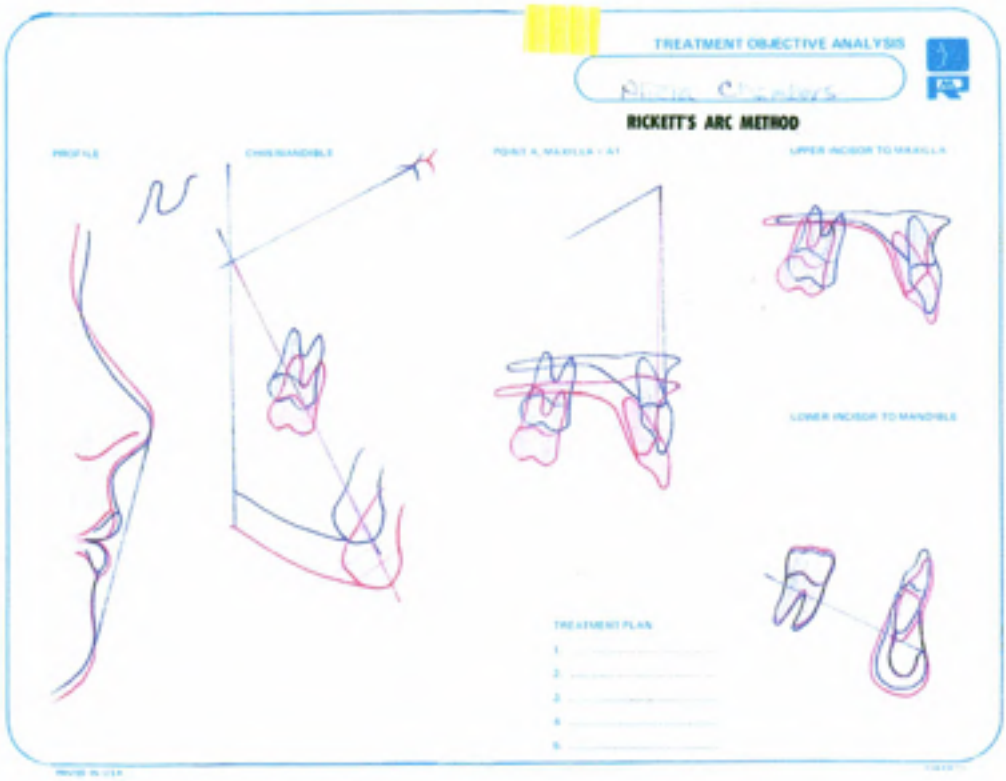
A.C. Forecast

Cut off 15 Yr.



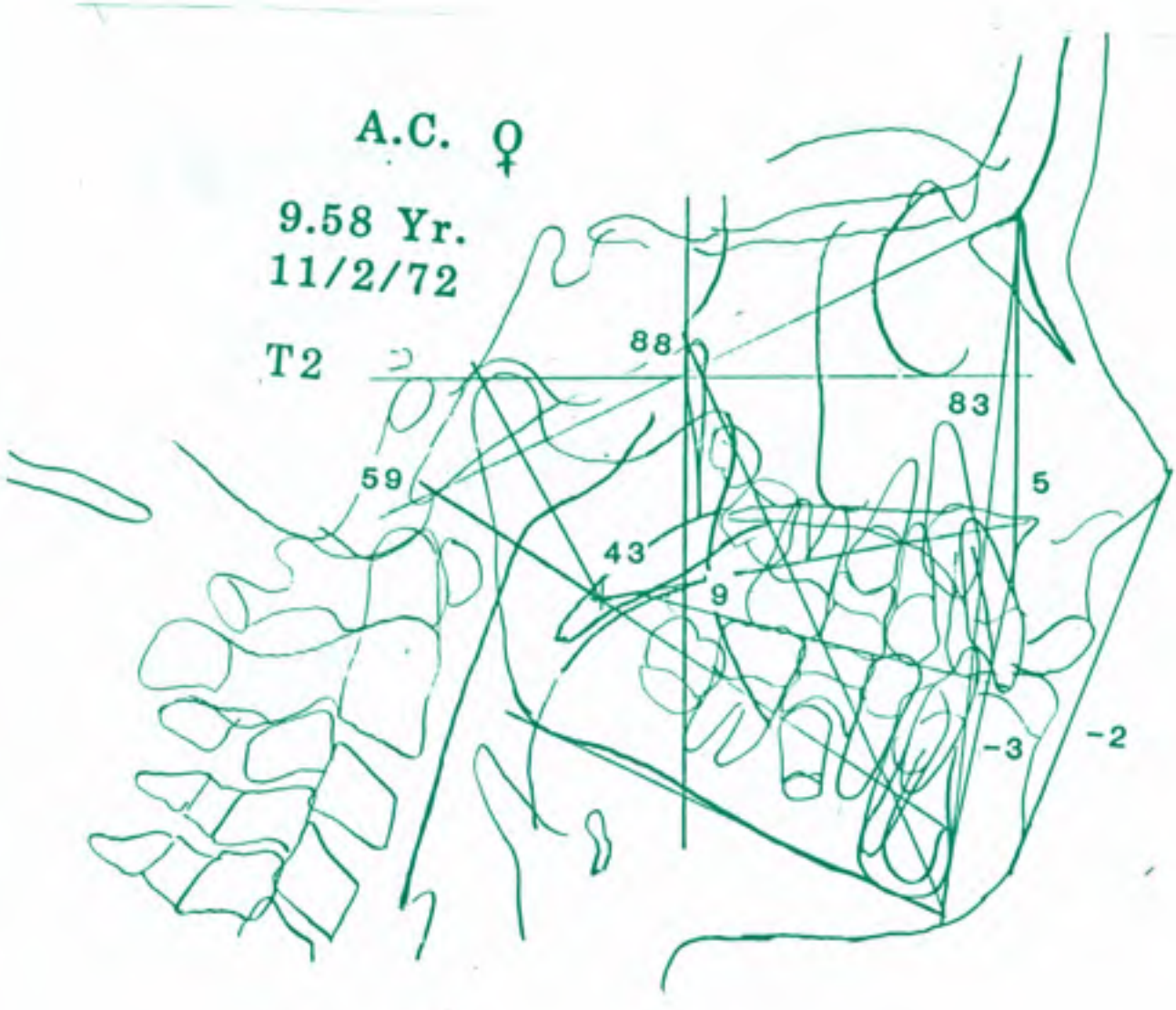
A VTG for A.C. from age 7 to age 15. Note impacted third molars.

FIG. 11-16-iii



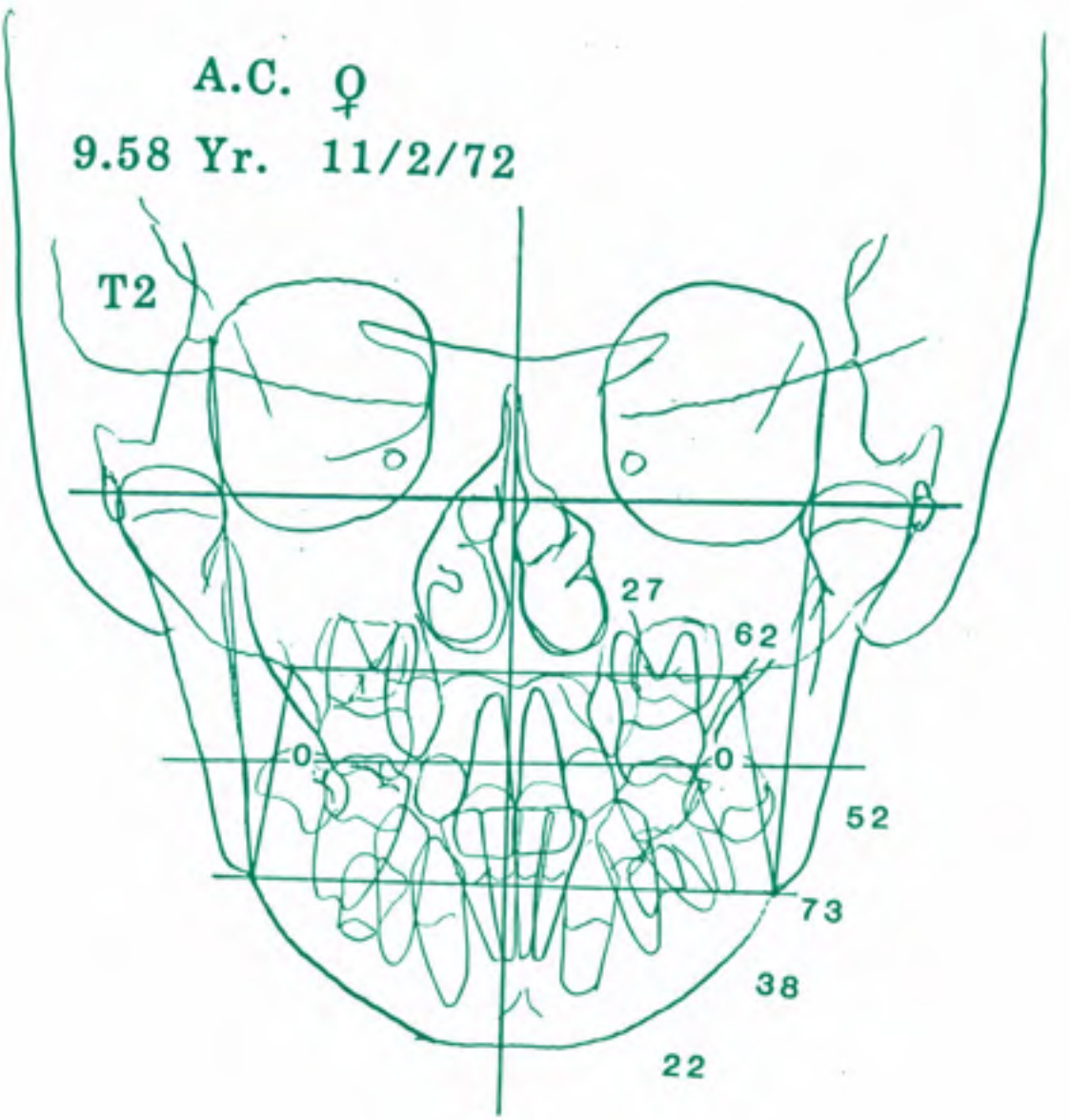
Analysis of the forecast in long range. Red is the objective.

FIG. 11-16-iv



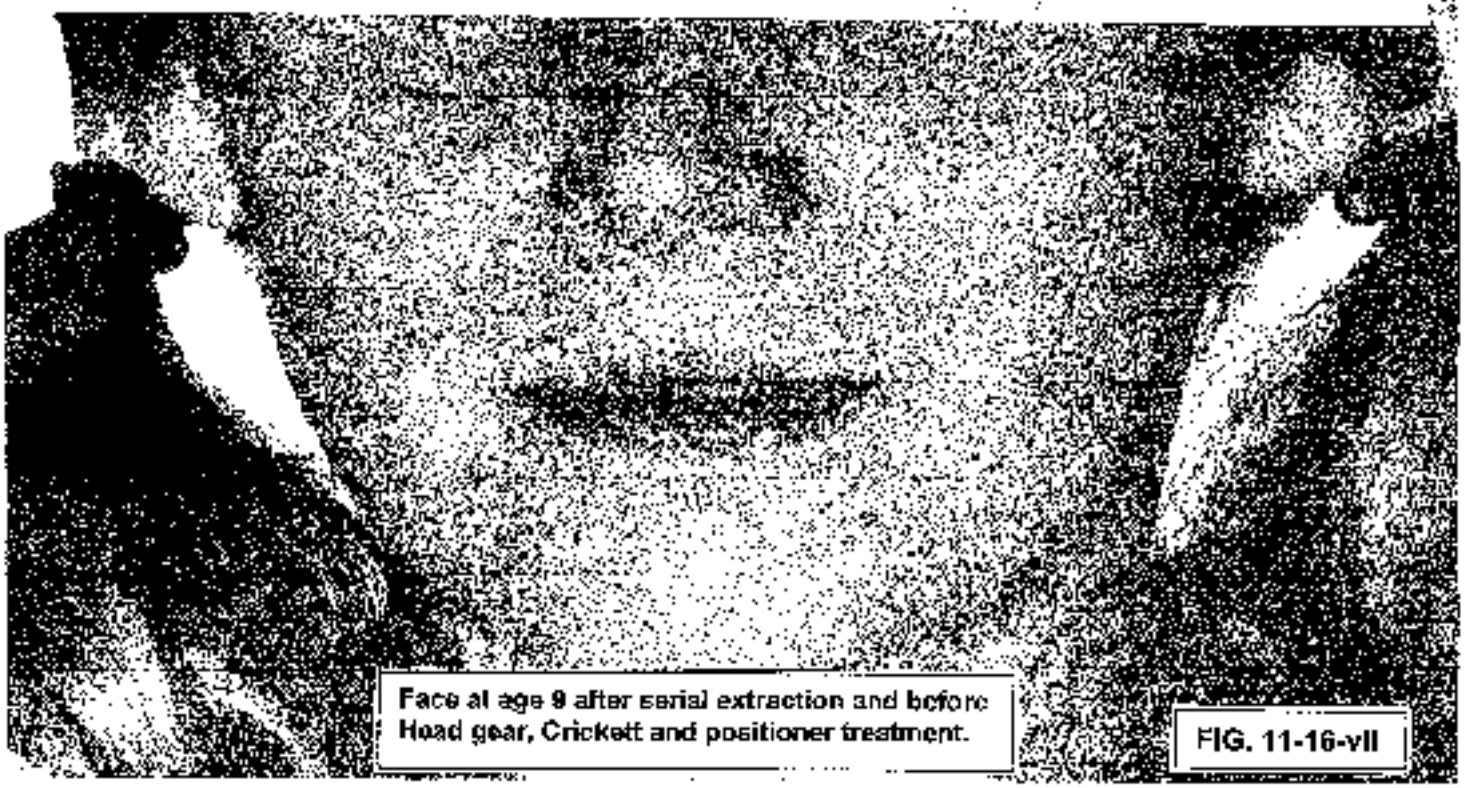
Patient A.C. two years later with no mechanical treatment. Note deep bite developed and Class II continued. Note lack of canine space.

FIG. 11-16-v



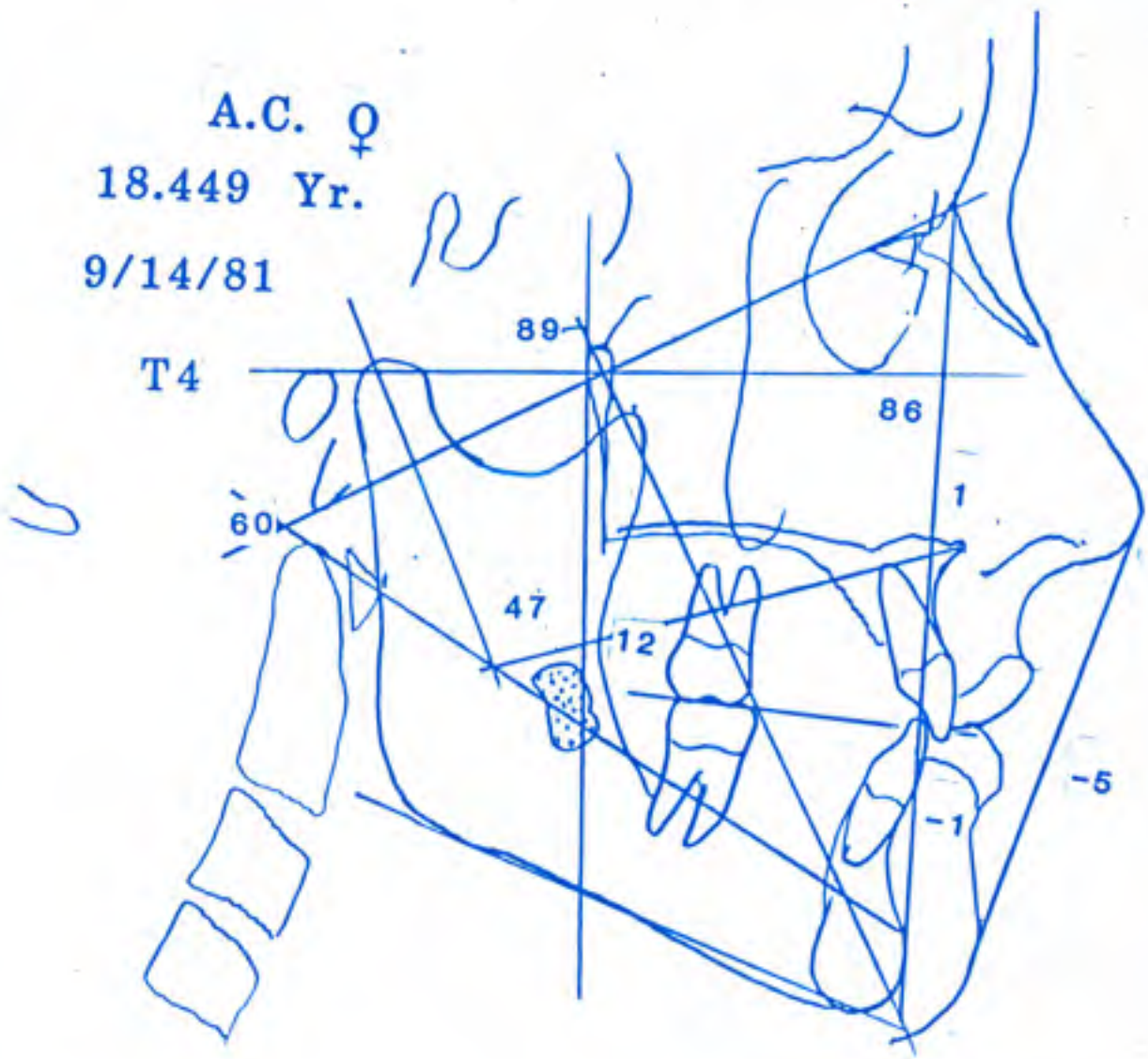
Frontal film shows the alignment of upper and lower incisors but canine space inadequate. Head gear on the upper was started.

FIG. 11–16-vi



Face at age 9 after serial extraction and before Head gear, Crickett and positioner treatment.

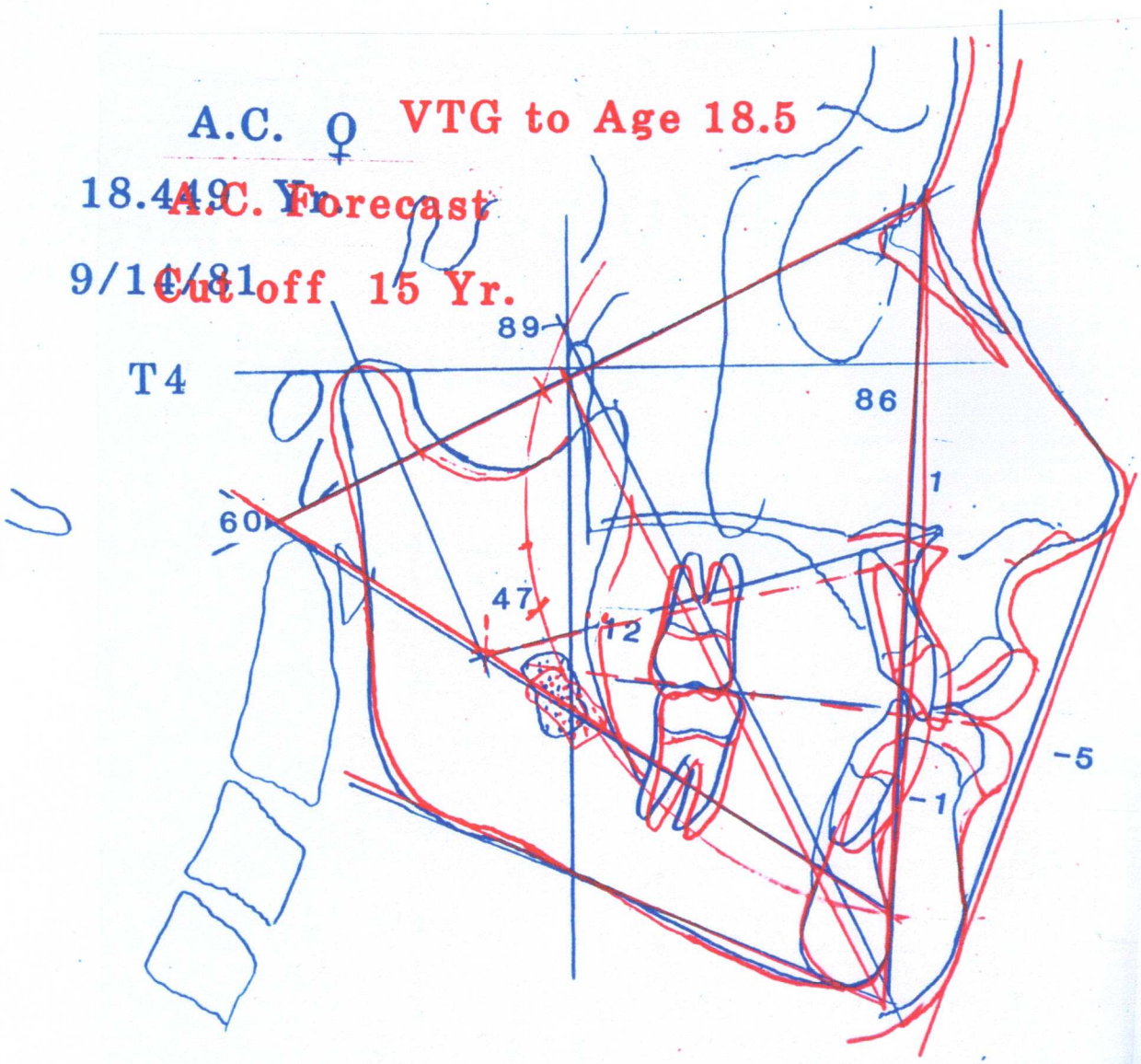
FIG. 11-16-vII



A.C. at age 18 with no fixed bands employed except upper first molars. Note the good face. Patient was a model.

FIG. 11-16-viii

Note face at 18 years still has a narrow mouth
But pleasing profile.



Comparison of the forecast VTG to the treated actual. Note the denture retracted more than ideal.

FIG. 11-16-x








Case # 16 - 1

A

B

C

D

Case # 16 - 2

LEGENDS FOR CASE # 16

Case # 16 – 1 A.C. Female

6/25/70 showing severe anterior crowding, Class II. Division 2, and rejection of appliances at age 6.

Serial extraction was performed. By 11-2-72 the midline was correct and upper and lower incisors were aligned. However, all four canines were now limited for space.

A head gear was placed on the upper and a cricket appliance was employed on the lower as shown. Over expansion was produced.

Case # 16 – 2 A.C.

Above – four views after expansion.

Below – four views after positioner had been worn. Note the correction of the upper canine.

Case #17 G.S.? Arch Length Problem – Borderline Extraction

This patient was first seen in 1960 at age 8.2 years (**Fig. 11-17 series**). Minor crowding was present in the lower incisor area and space for both upper lateral incisors was inadequate. The central incisors were rotated distally.

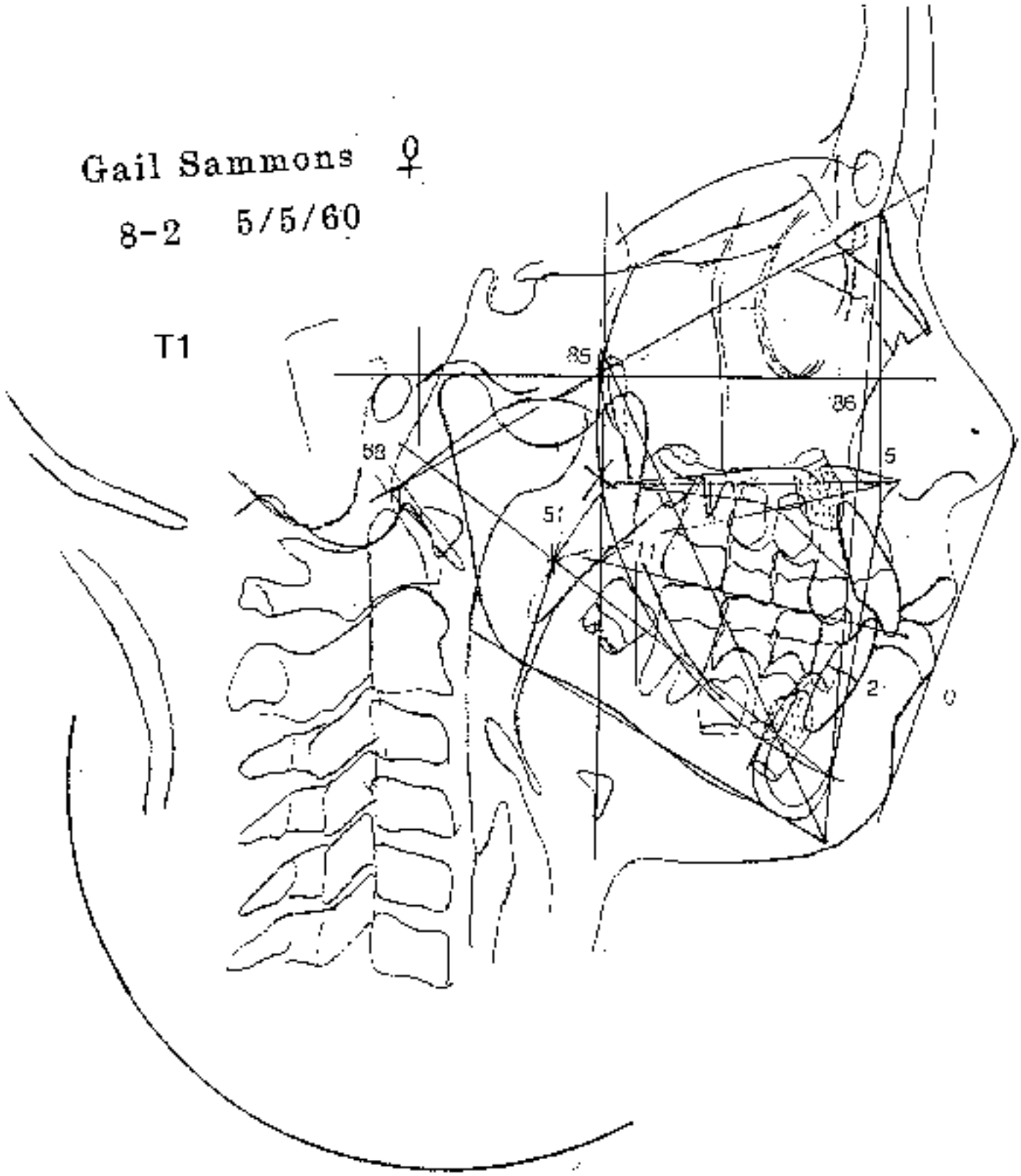
Analysis revealed a slightly long narrow type face to be present. The growth prognosis and planning suggested a borderline extraction. The three choices were considered. First, nothing could be done but to observe. Secondly, a quad helix and bi-helix could facilitate space development. Thirdly, serial extraction could be performed to permit the eruption and alignment of the lateral incisors. Due to the forecast and mouth strain on closing the latter treatment regime was selected. Also the canines were in precarious position of impaction.

Treatment

First phase – all four deciduous canines were removed. No other treatment was recommended until development had occurred which was four years later.

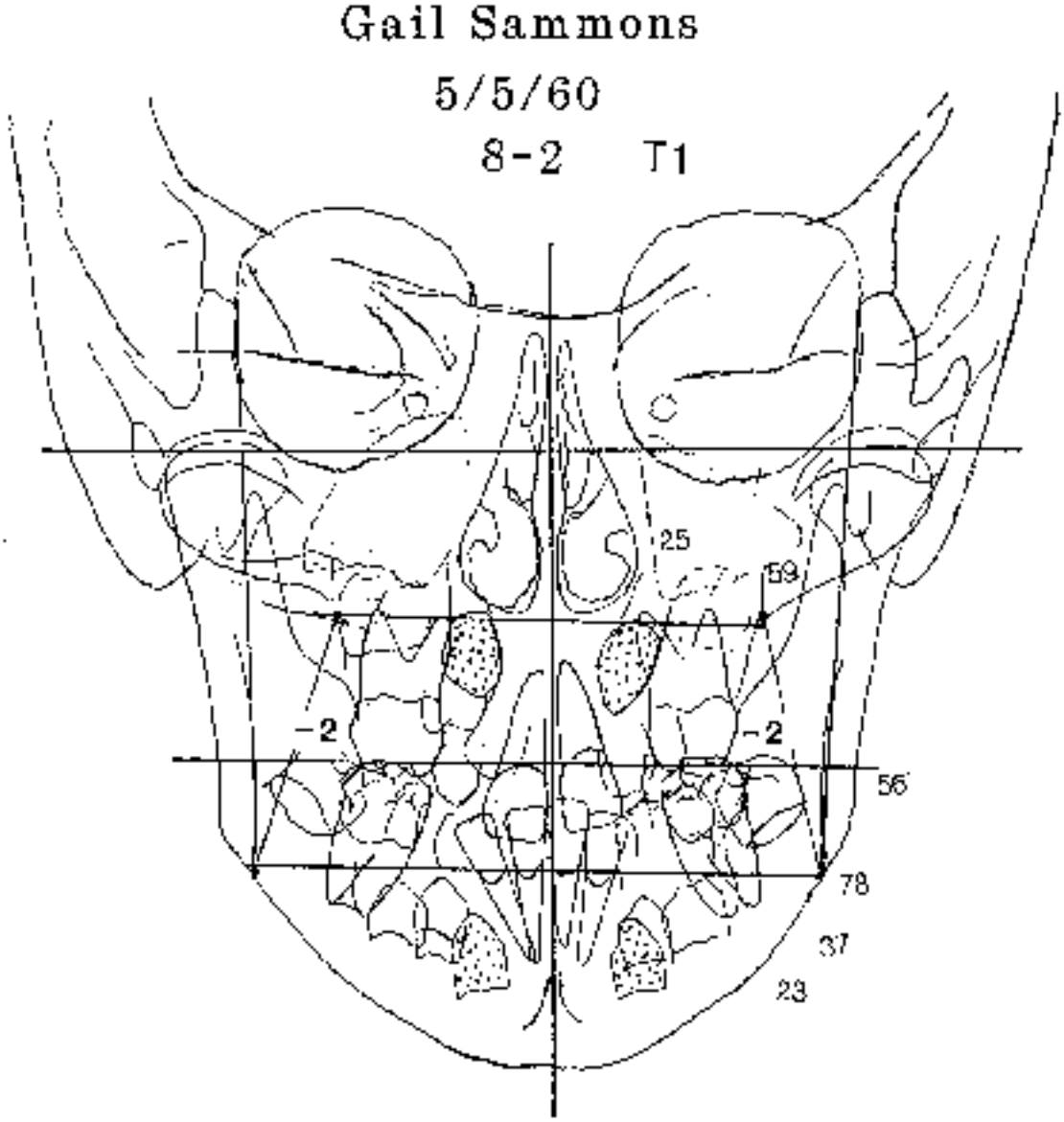
The second phase was delayed until the canines and the premolars had erupted. This was at age 12.9 years. The patient **had actually become more protrusive during the more than four years of observation** and the upper canines became blocked labially.

Extraction of four first premolars was performed. Extraction mechanics as practiced in 1965 was conducted. Canine retraction sections was followed by utility archos. Sectional mechanics was then employed to reduce the upper buccal segments. Idealization and finishing was performed with straight wire. Overtreatment was accomplished. **No retention was employed.** The result was rewarding and still stable at age 21 yrs.



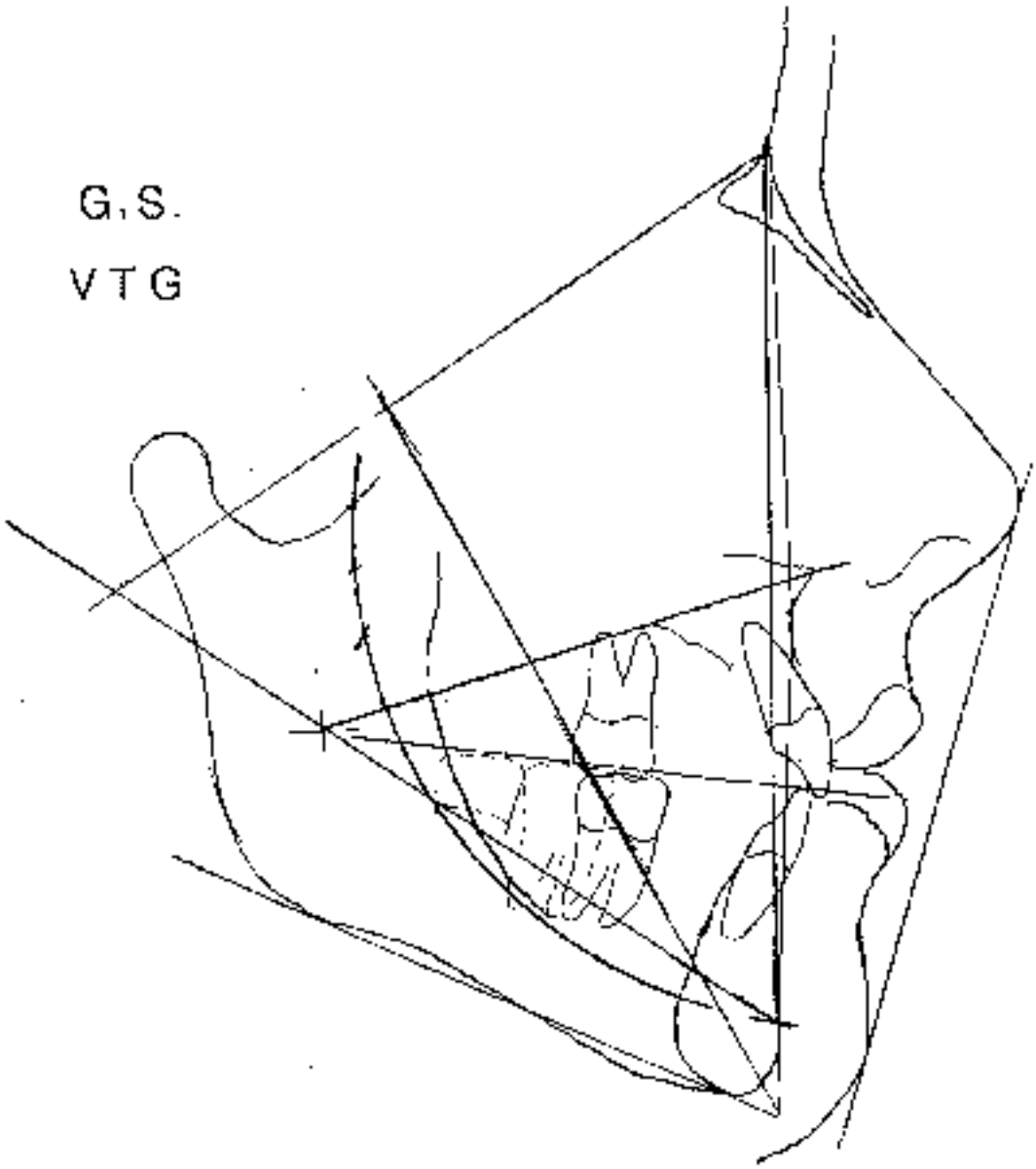
Lateral analysis on G.S. at age 8. The denture was slightly protrusive and crowded and upper canine space was suspect. Forecast showed continued vertical tendency.

FIG. 11-17-i



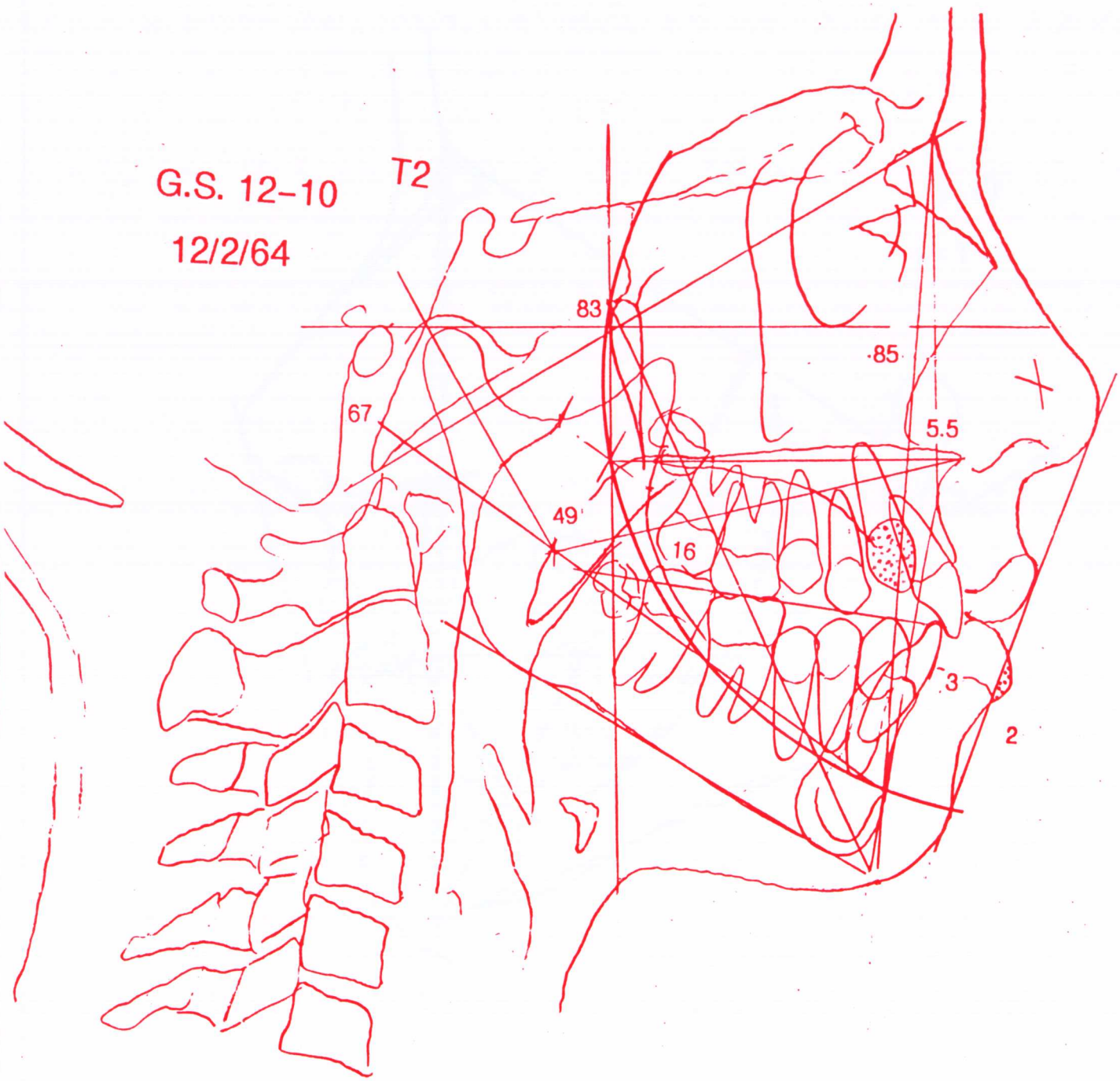
G.S. Frontal T1.
Although Class I, the upper molars are in slight cross-bite by measurement (-2). Four deciduous canines were removed after the prognosis was made.

FIG. 11-17-ii



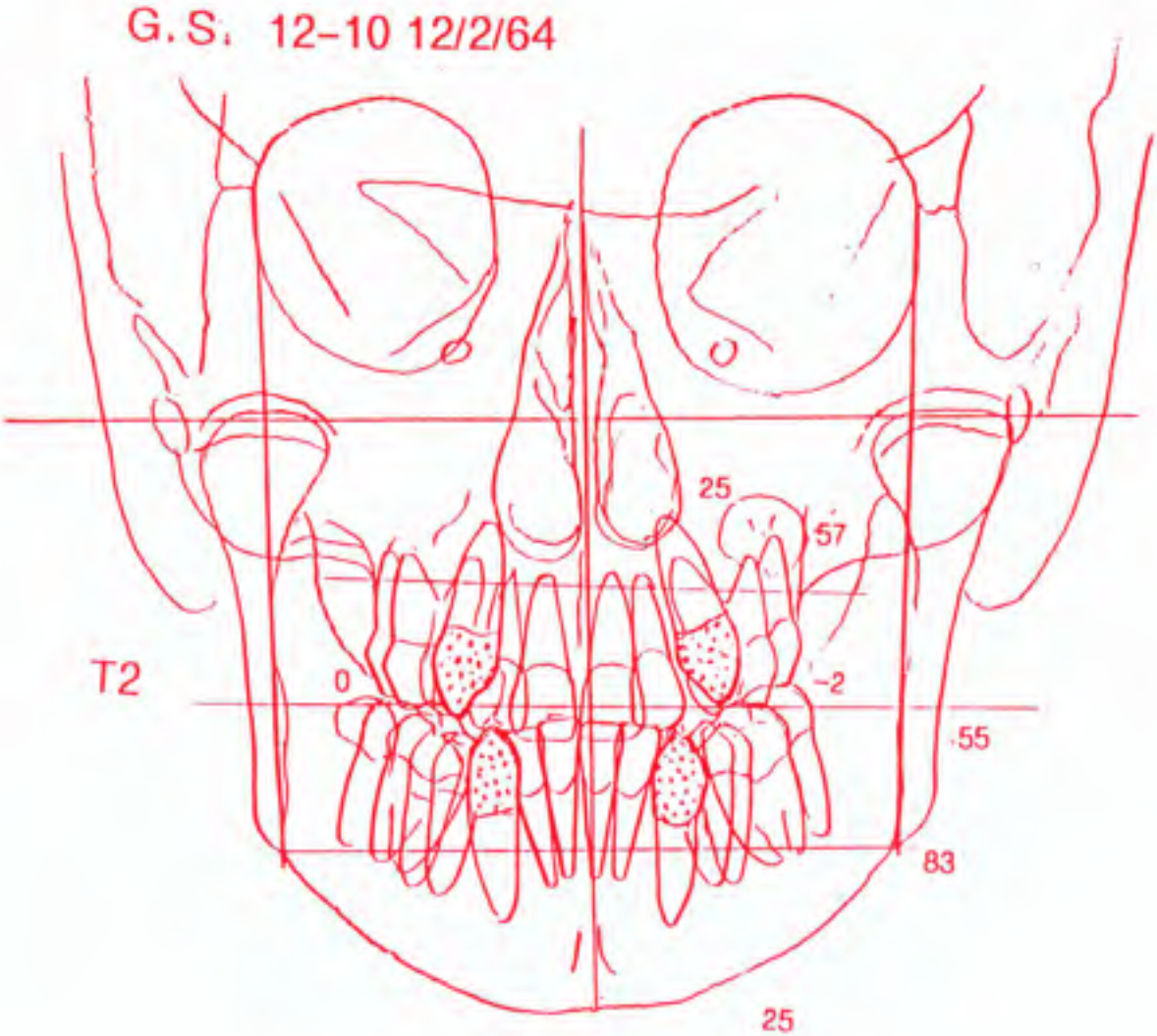
A forecast with VTG for G.S. to age 15 cut-off (the mean is 14.8 years). Note the nice profile but further notice the dotted lower molar indicating the needed distal movement without extraction.

FIG. 11-17-iii



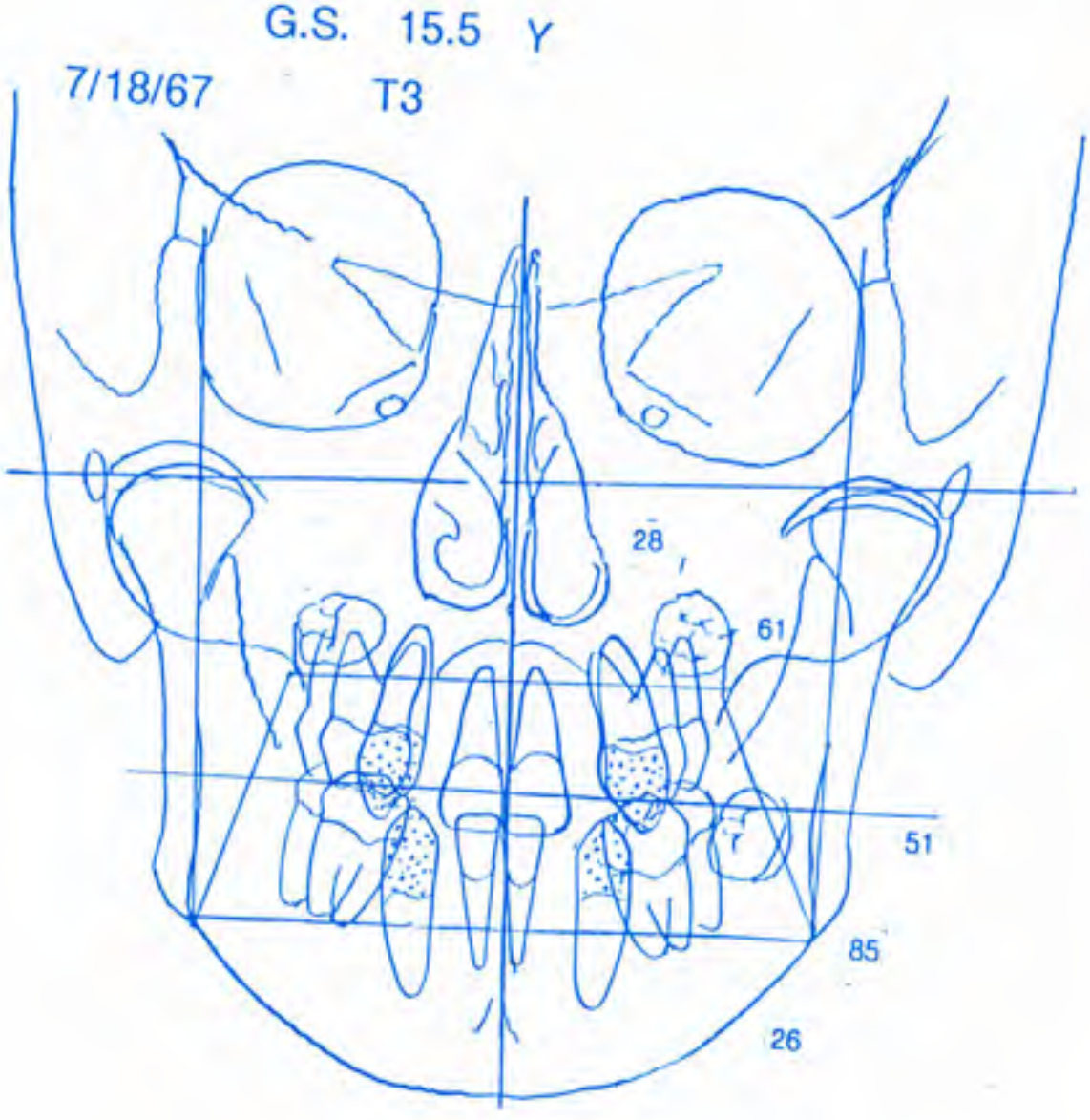
G.S. After four years with only four deciduous canines removed. Note the denture is now more protrusive, the buccal segment is toward Class II and the upper canines are blocked labially. Now four first premolars were removed.

FIG. 11-17-iv



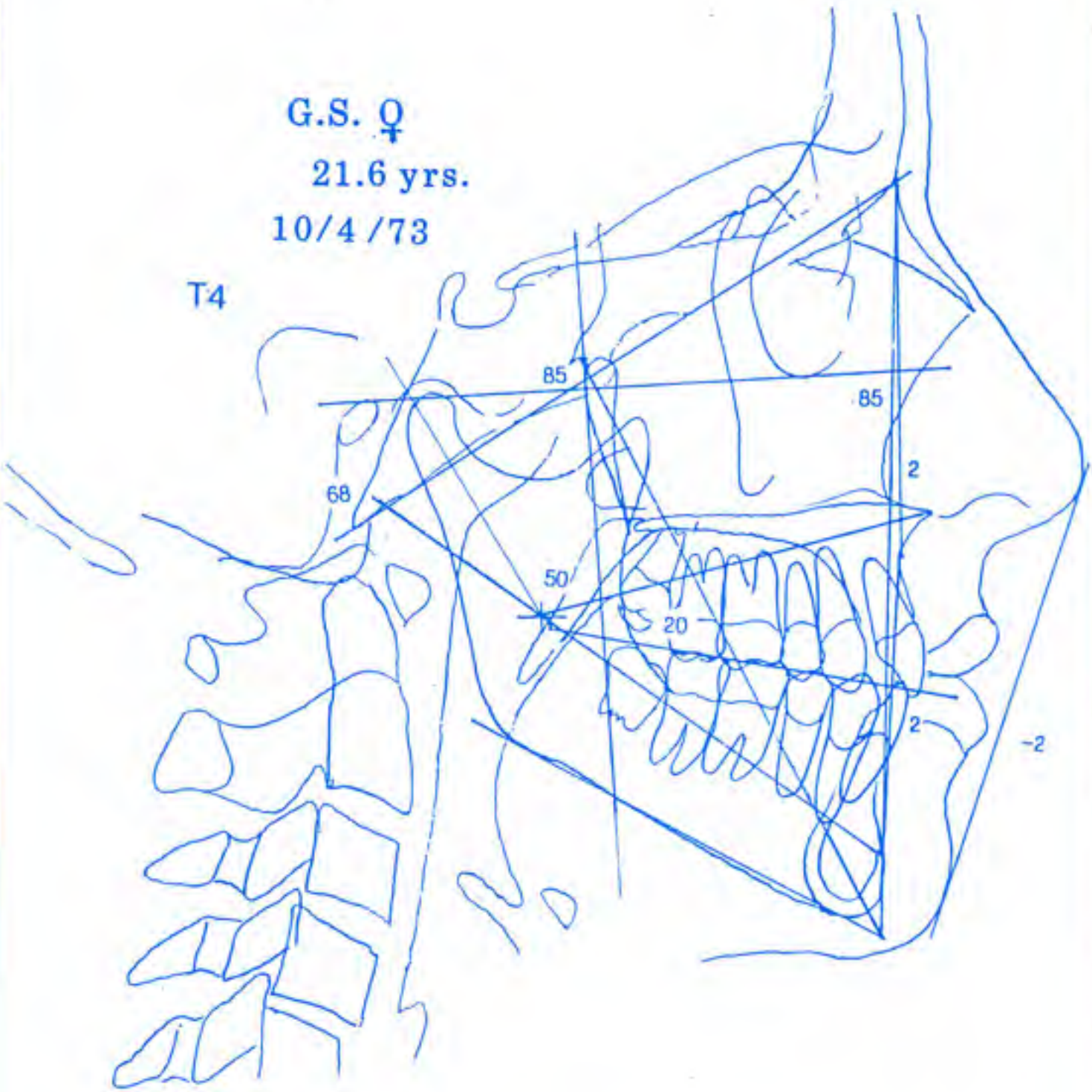
Tracing of the frontal at almost age 13 shows the high canines and continued molar relation. The midlines are to the patients left slightly.
Four first premolars were removed for the Bioprogressive extraction method.

FIG. 11-17-v



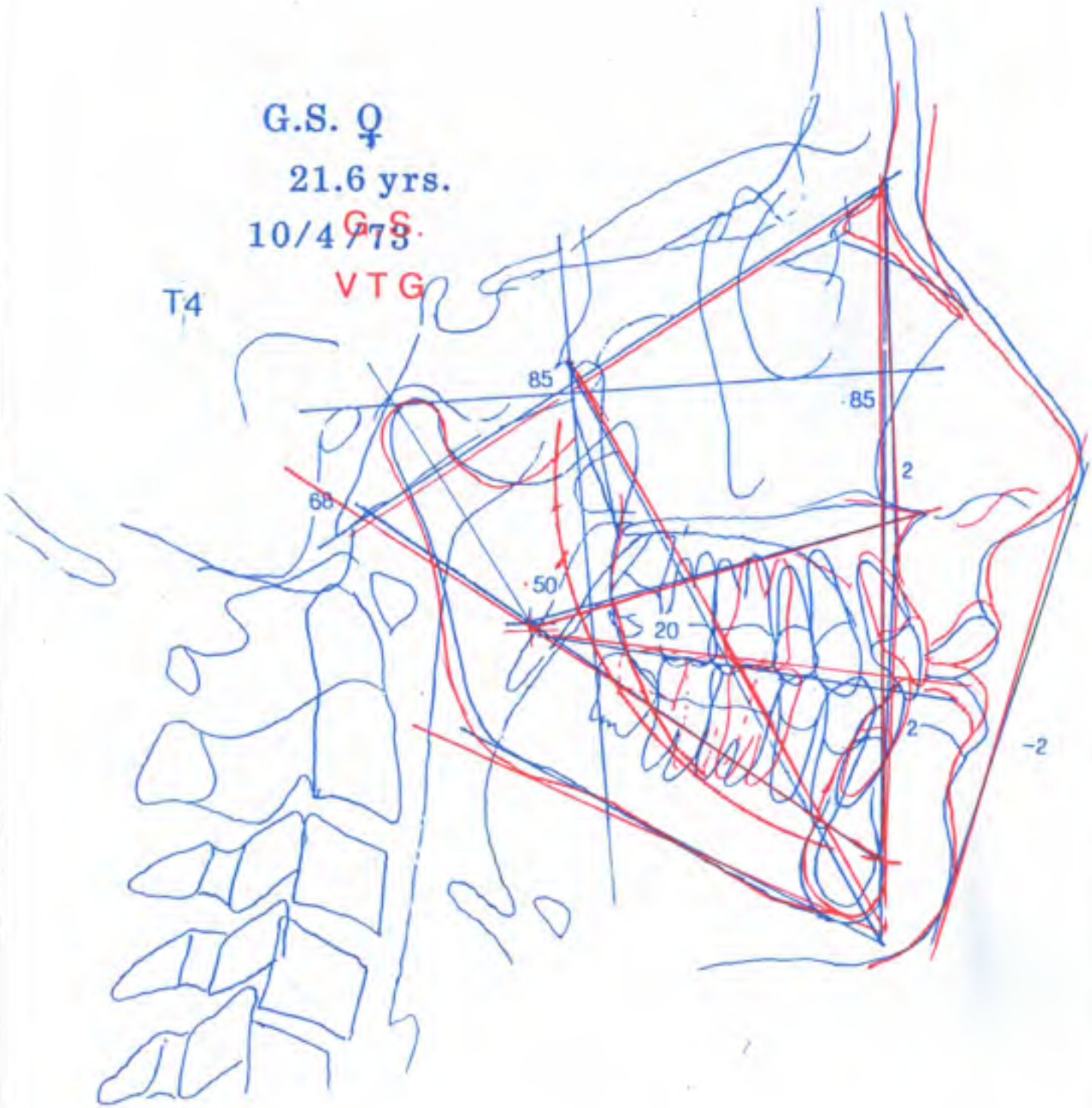
Retention film traced to show angulation and position of the canines. The midline asymmetry was improved.

FIG. 11-17-vi



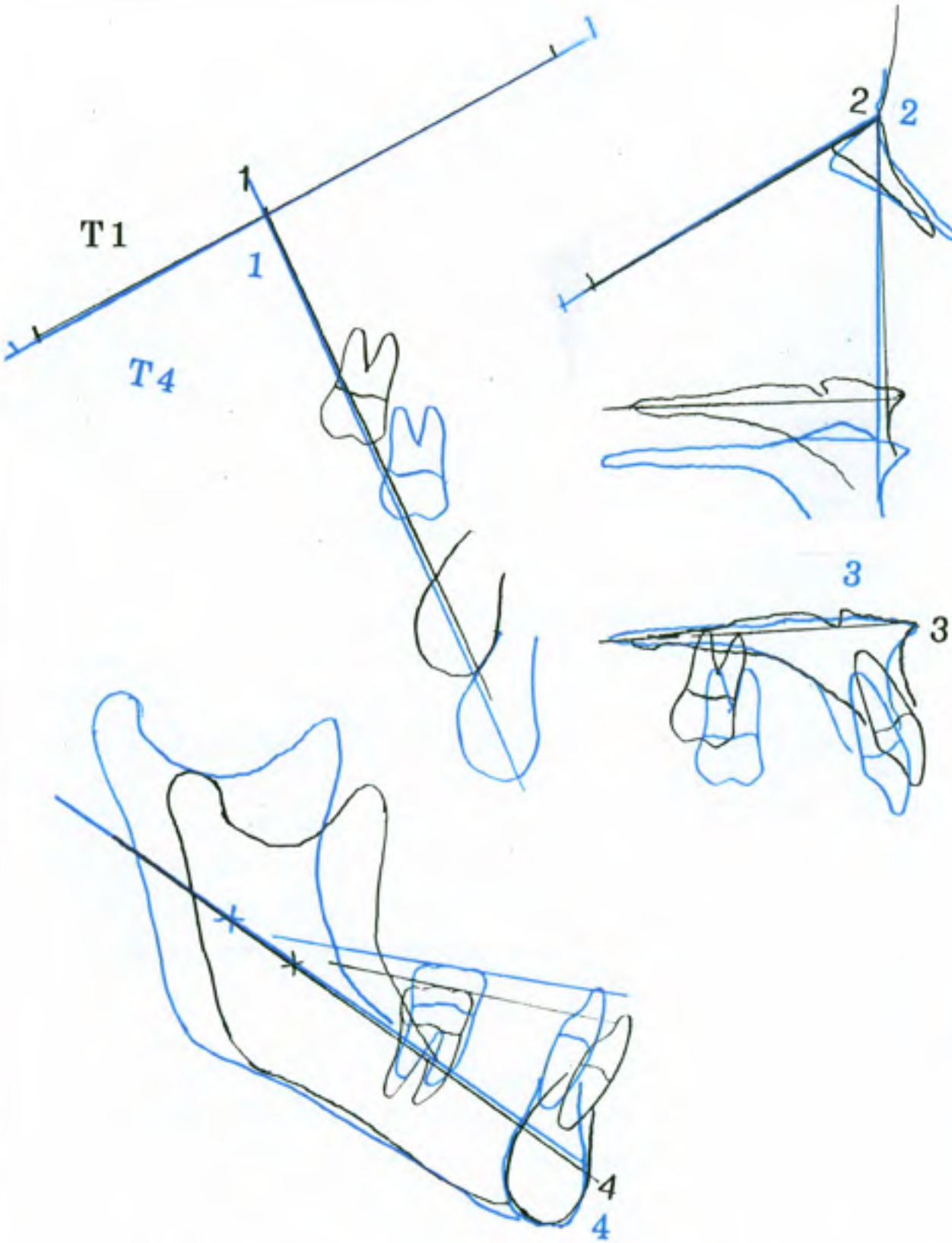
The patient G.S. at age 21. Note the third molars are erupting and have space. The profile is quite pleasing.

FIG. 11-17-vii



The comparison of the treated actual (Blue) to the VTG (Red). The treatment exceeded the denture retraction objective.

FIG. 11-17-viii



The four position analysis from age 8 (Black) to age 21 (Blue) . The upper molar was moved forward (with extraction) while the Facial Axis remained steady. Point A was reduced (Position 2 and 3). In position note the stability of the molar and retraction of the incisor.

FIG. 11-17-ix

Case # 18 D.P.? Complicated Class II with severe Bi-maxillary restriction started in the Deciduous Dentition

This patient was first seen at age 6.0 years (9/62) **(Fig. 11-18 series).**

Facial Asymmetry was present which involved a partial nasal atresia. The palate was tipped upward and was very elevated. Both arches were grossly narrowed. Severe Class II open-bite was present. Remarkable crowding was present in both arches. The long range forecast suggested a continued vertical growth pattern.

Treatment

The first step, in reaction to the narrowness and the crowding, was the serial extraction of deciduous canines.

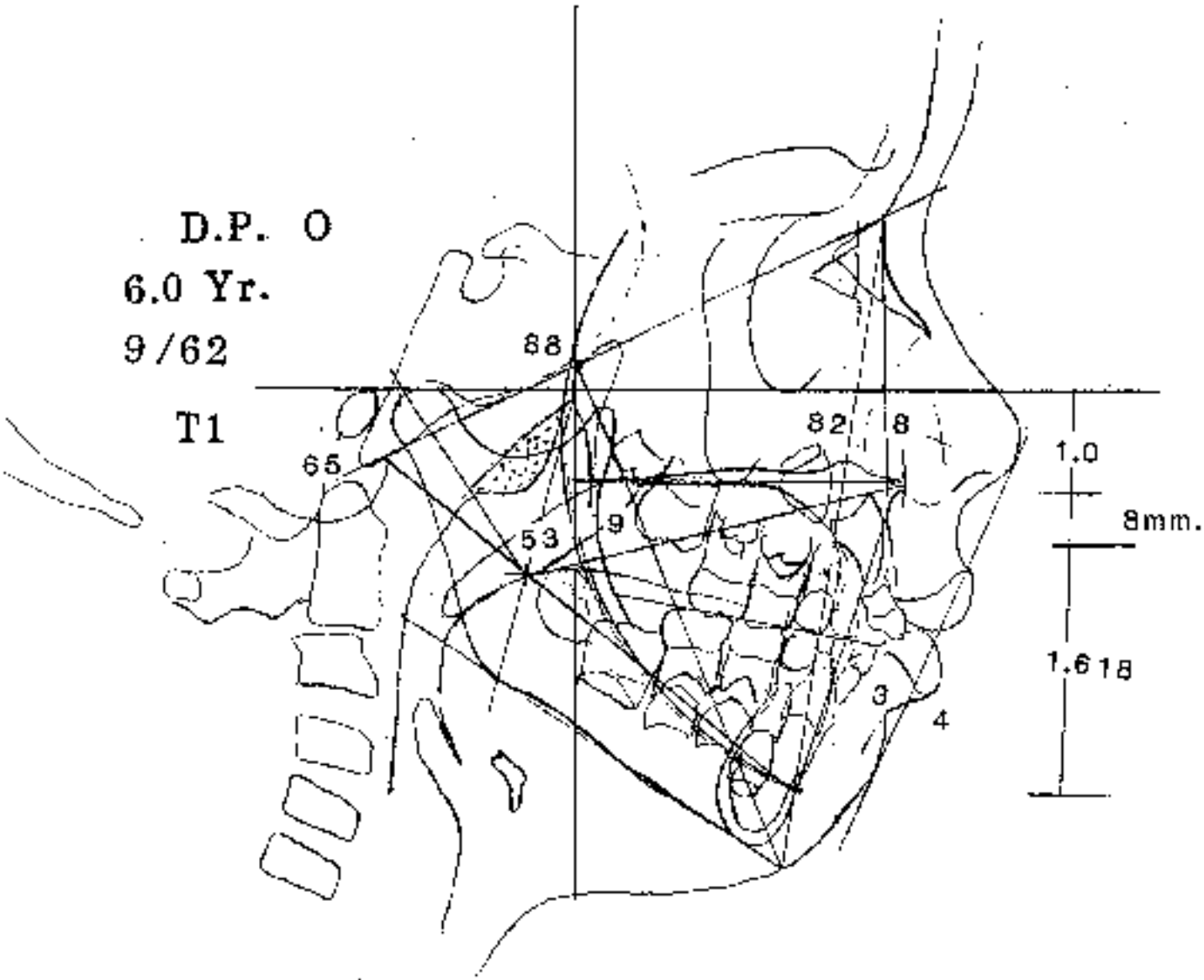
After the lateral incisors had developed at age 6 7 a palatal expander was placed. This however was not enough. After two months, a second jackscrew was employed in the attempt to improve nasal Asymmetry. On 9-24-64 a third expansion appliance was employed. On 12-17-63 a face bow was placed on the E|E.

At age 10 lower second premolars and upper first premolars were removed. A headgear on 6|6 was employed to start the Class II correction. Routine extraction therapy was carried out. Sectional mechanics was employed for the finish of the Class II correction. The patient was routinely retained.

Comments:

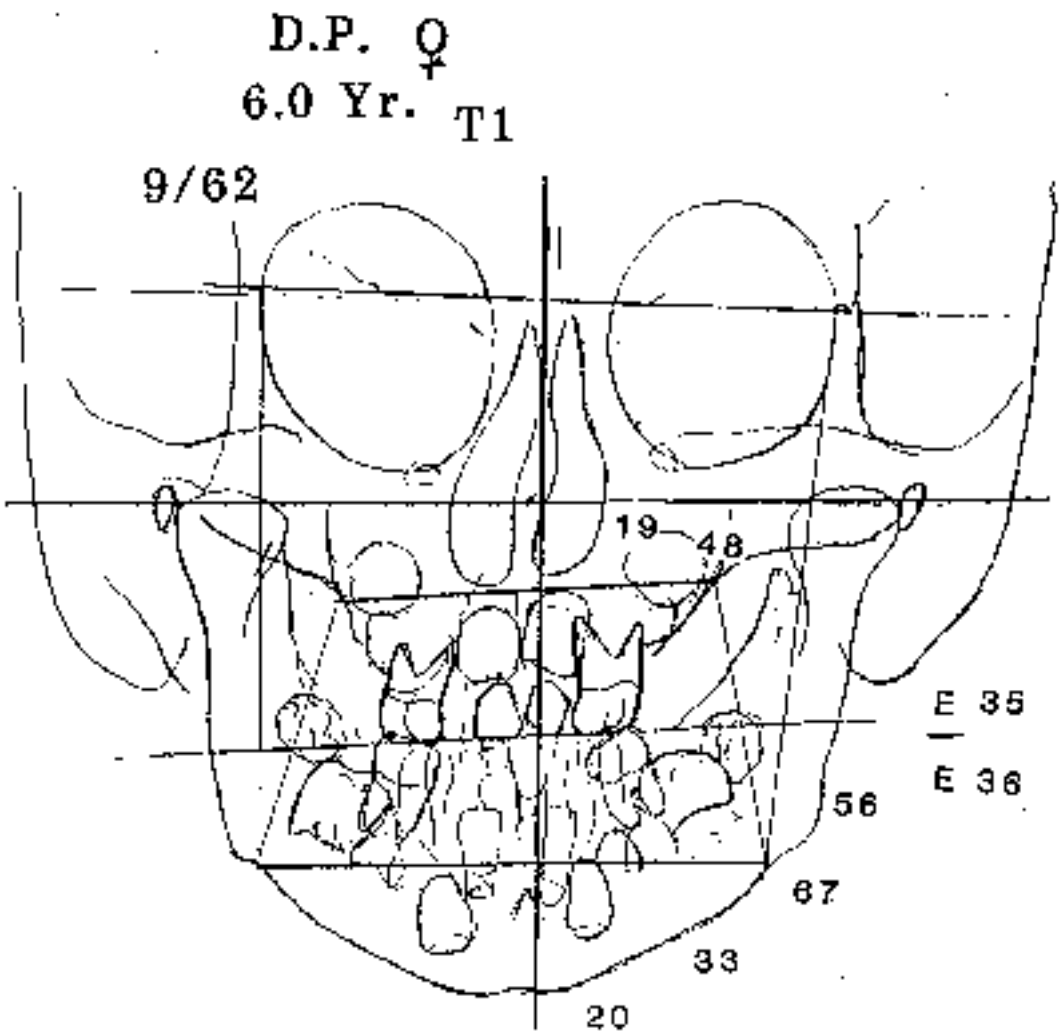
Long term growth confirmed the forecast. The retraction of the denture anteriorly relieved the lip strain. The cranial asymmetry in the orbits remained but improvement of nasal asymmetry was significant.

In the end, the thought occurred that despite the remarkable narrowness, the patient could have been managed without extraction. Still the treatment was deemed to be successful and **orthognathic surgery was avoided** as a result of early treatment.



A six year old with major dysplasia and asymmetry. The palate is elevated. Note the the Divine Proportion of 1.0 to 1.618 from Frankfort Plane (0) to A point to Pm point is 8 mm. off. A point is high for the face. The Total Facial Height Angle at 65° is almost 2 S.D. long. Note the 53° lower face height angle and 8 mm. convexity.
Serial extraction was started for this desperate situation. Note the low tongue posture and adenoid.

FIG. 11-18-I



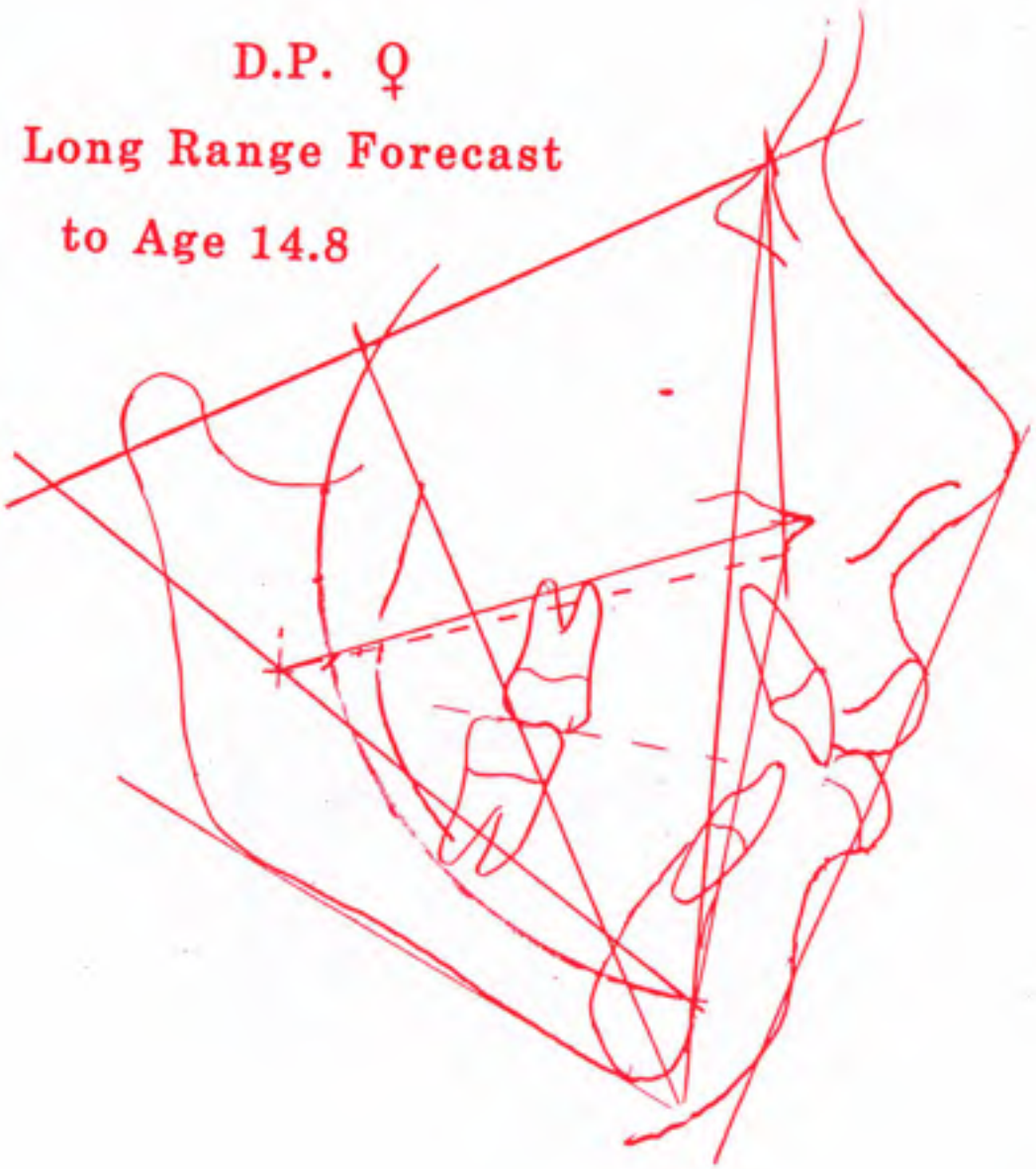
The Frontal head plate showed asymmetry and remarkable narrowing of the maxilla and both arches. Normally the width at the buccal of the lower second deciduous molar is 47 mm. cephalometrically. This patient is 36. The upper mean is 50 mm.; this is 35!

FIG. 11-18-ii

D.P. ♀

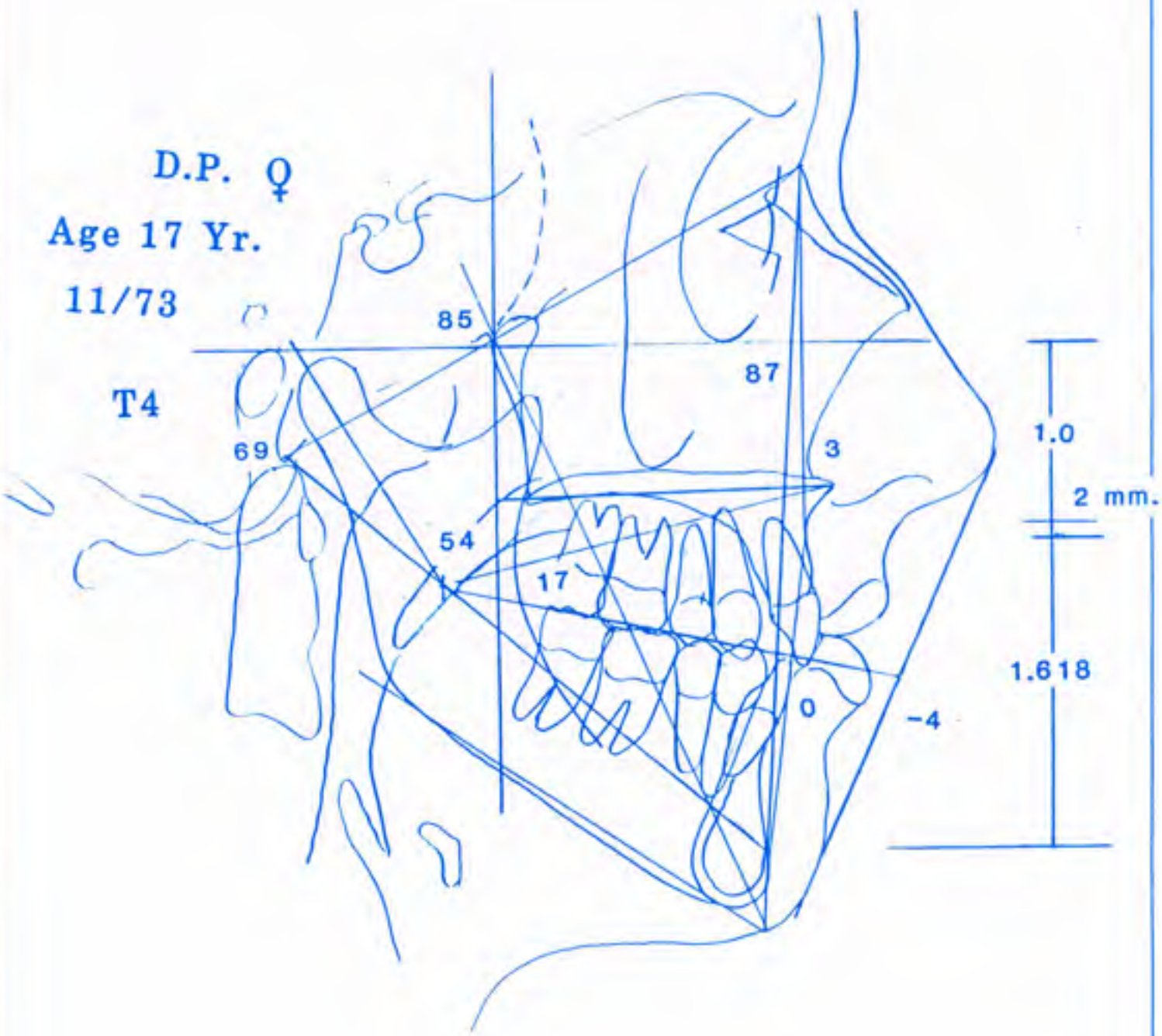
Long Range Forecast

to Age 14.8



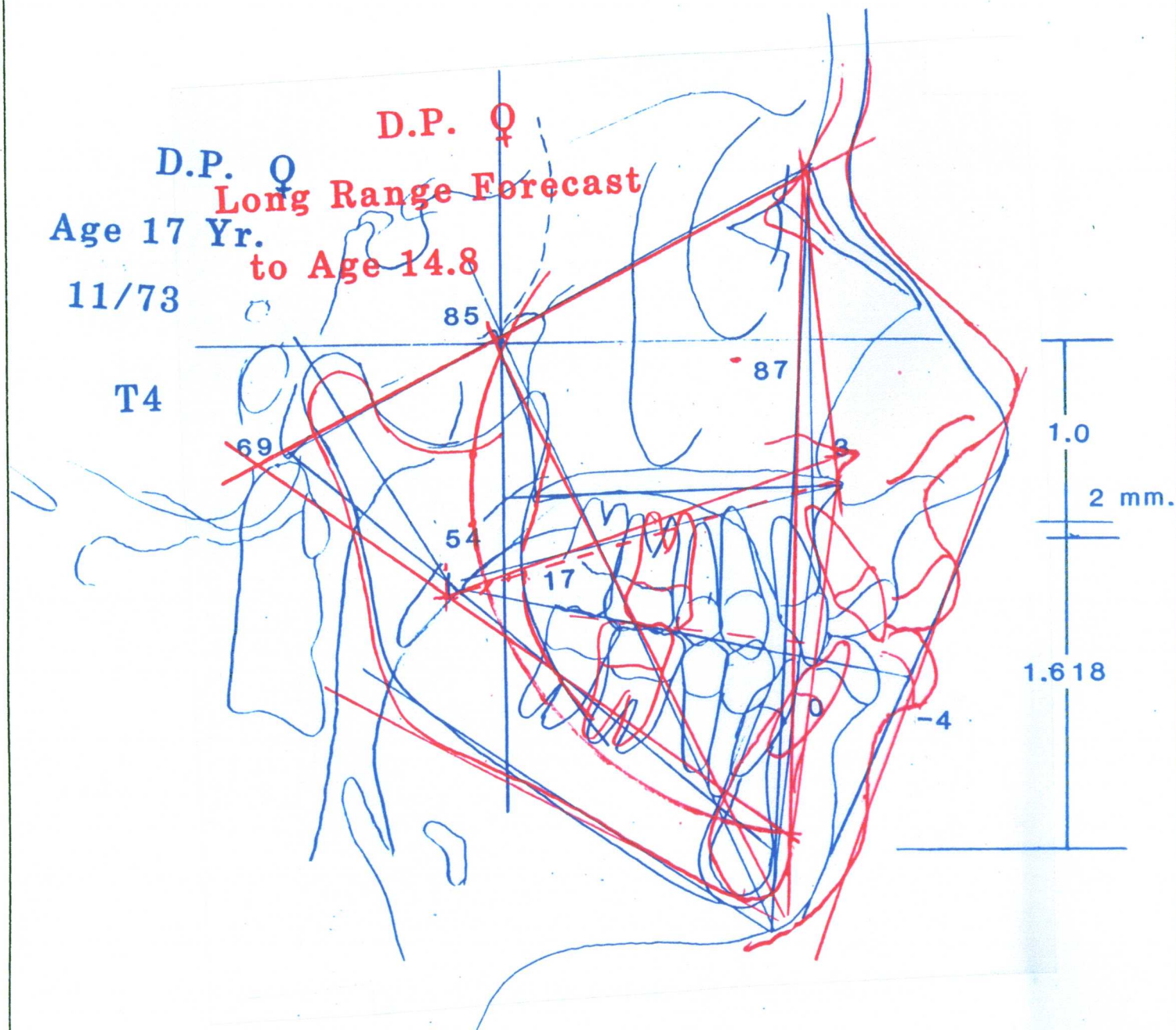
The forecast without treatment suggests a handicapping malocculusion. The treatment was to be palatal dysfunction and cervical traction for maxillary orthopedics.

FIG. 11-18-iii



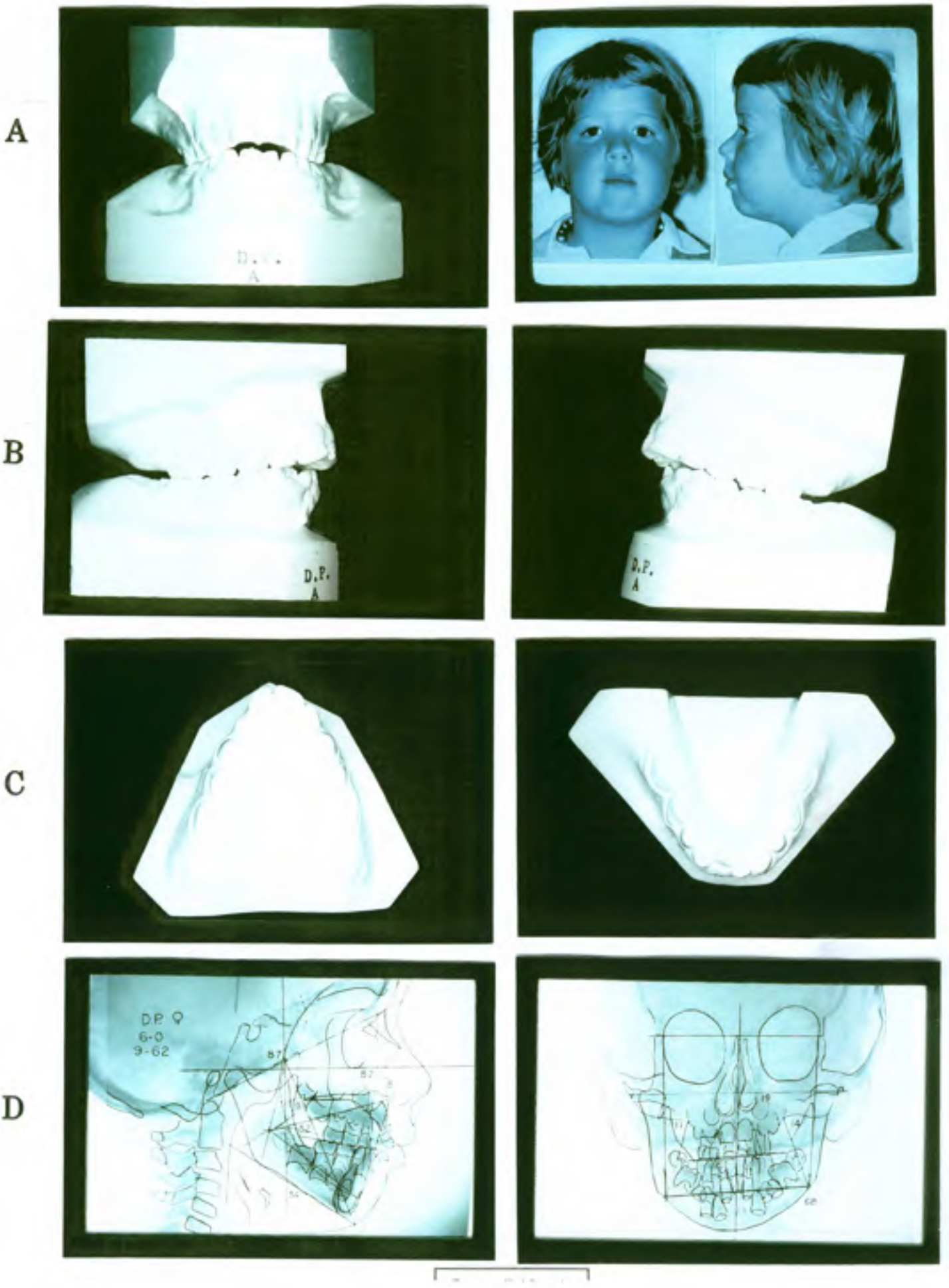
This post treatment record shows now almost the divine proportion in facial parts vertically. The esthetics was remarkably improved and surgery was avoided.

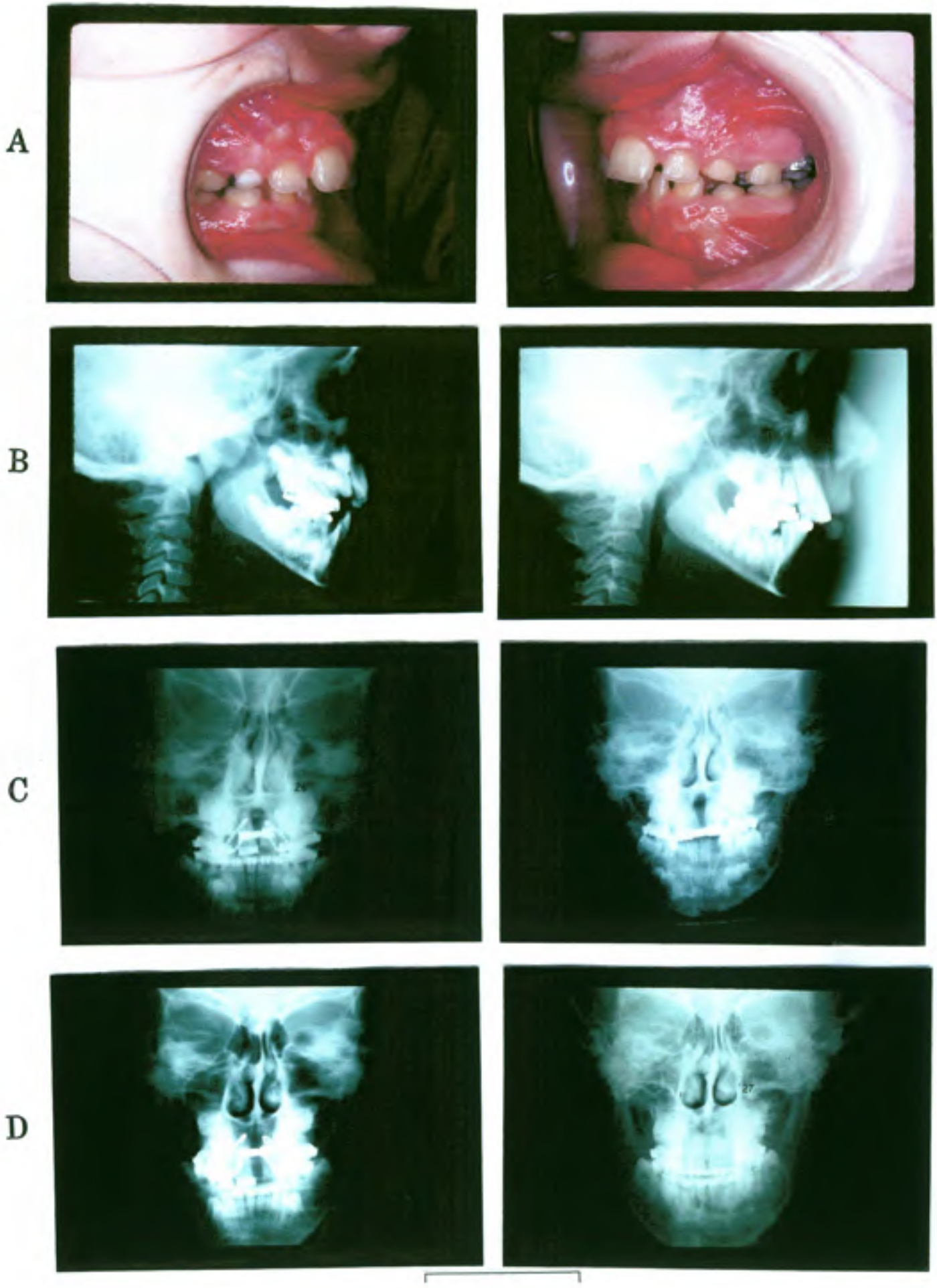
FIG. 11-18-iv



The forecast without treatment (Red) compared to the actual (Blue). The mandible grew as predicted but shifted backward. The midface (and soft tissue nose) was remarkably reduced. Compare the treated lower incisor position to the forecast. From the forecast, the upper lip was moved backward a full centimeter.

FIG. 11-18-v

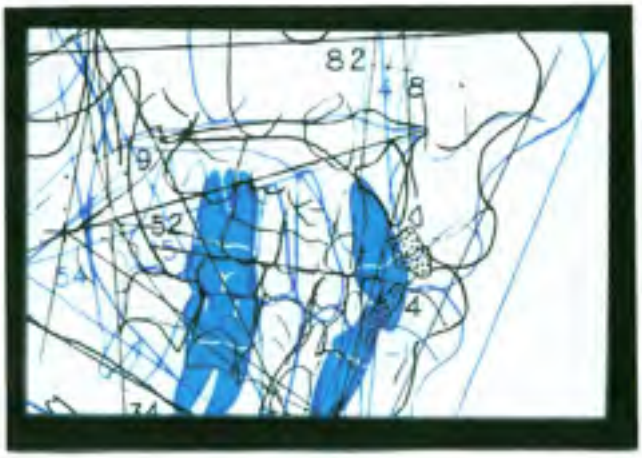

A
B
C
D
D.P.
A
D.P.
A
D.P. ♀
6-0
9-62

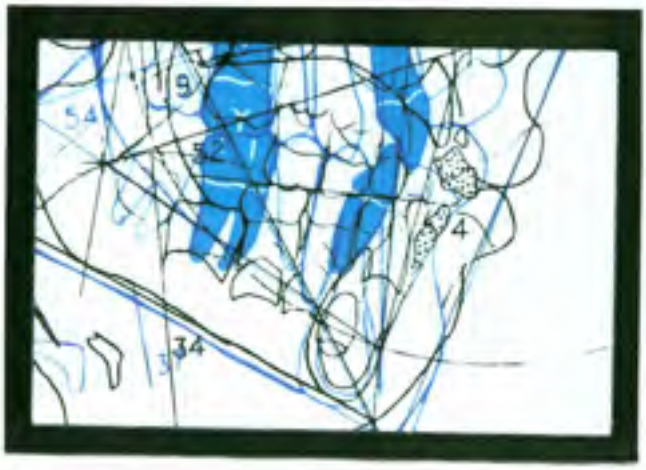

A
B
C
D

A

B

C





D

Case # 18 - 3

LEGENDS FOR CASE # 18

Case # 18 – 1 D.P.

A. Age 8.0 female with arches. Class II open bite with elevated palate and short soft tissue nose. Note poor facial proportion with excessive lower face height and severe asymmetry.
B. Models show Class II and
C. tapered narrow arches.
D. The analysis showing the asymmetrical nasal floor and maxilla.

Case # 18 – 2 D.P.

A. The condition after extraction of deciduous canines (still Class II)
B. Progressive lateral films during palatal splitting.
C. First and second dysjunction appliances.
D. Third dysjunction appliance in place and condition during finishing stage. Note 27 mm. nasal width as contrast to original 19 mm.

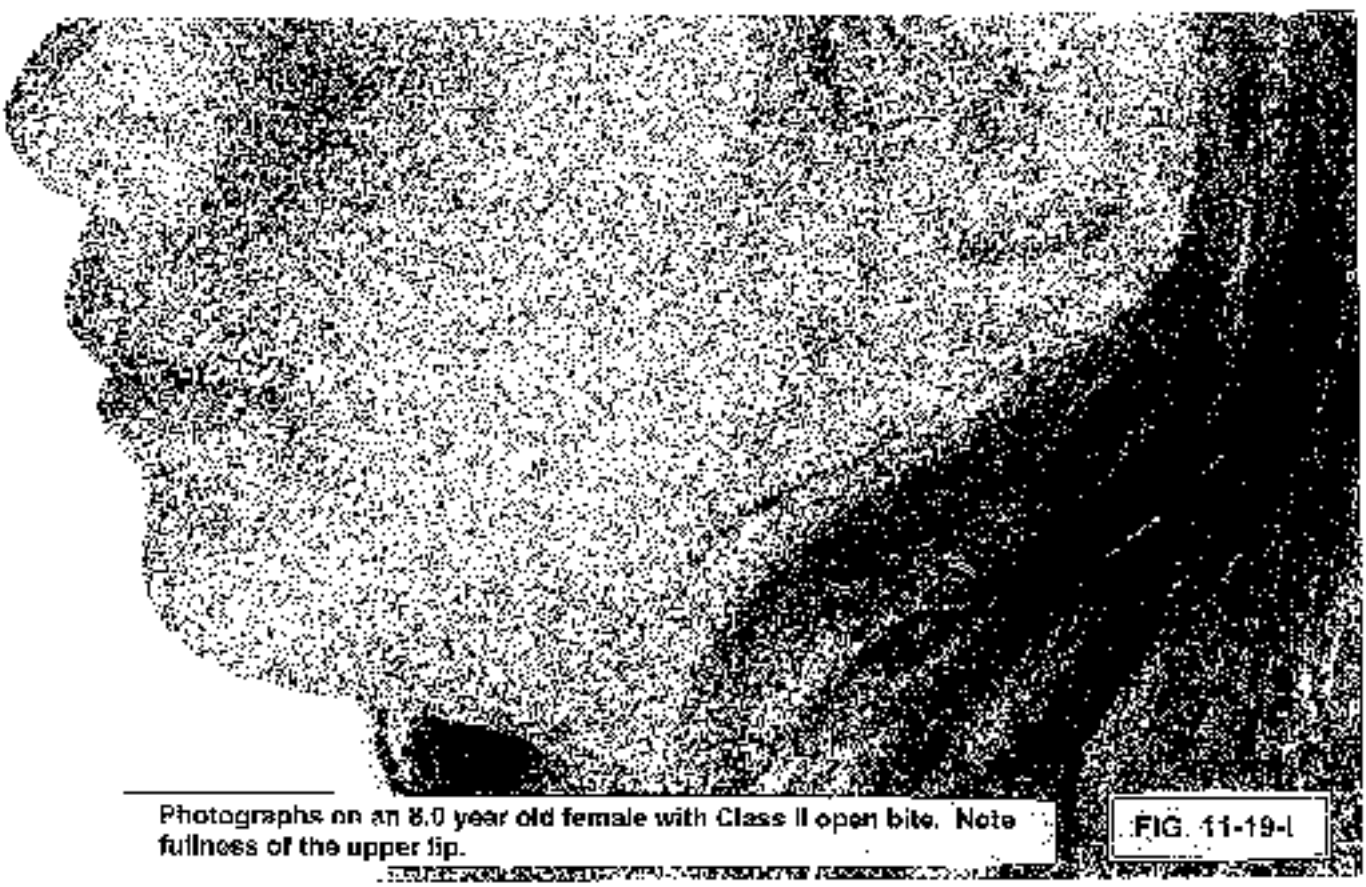
Case # 18 – 3 D.P.

A. Facial photos show very good proportions at age 18. Note the change in palatal height and nose length after premolar extraction and cervical traction.
B. Note facial height increase from age 6 to age 18 and improved arch form.
C. Position 3 shows retraction of upper incisors. Position 4 shows quite significant lingual movement of the lower incisor from the deciduous position (dotted).
D. Final occlusion.

VI. SUMMARY

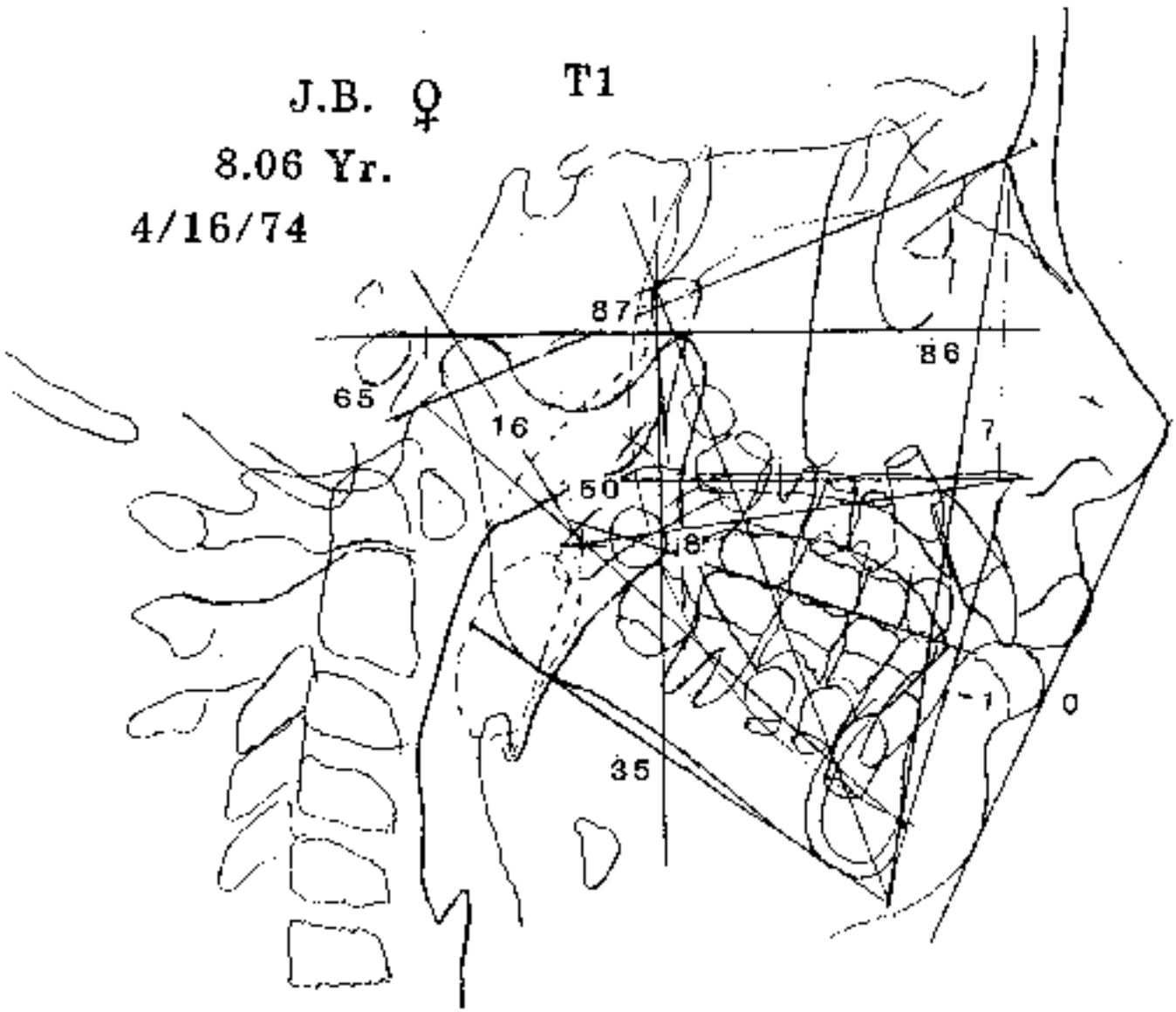
This second series of patients were selected to demonstrate procedures in the juvenile patient. Severely closed bite in Class II were addressed and intrusion and torque of upper incisors were demonstrated. Long term stability was proven in all cases.

. Extra oral traction of two types were described, i.e. cervical and hi-pull augmentation for anterior intrusion. The author positively rejects high-pull off the molars in view of numerous experiences. One of these is demonstrated in a final patient **Case # 19 (Fig. 11-19 series).**



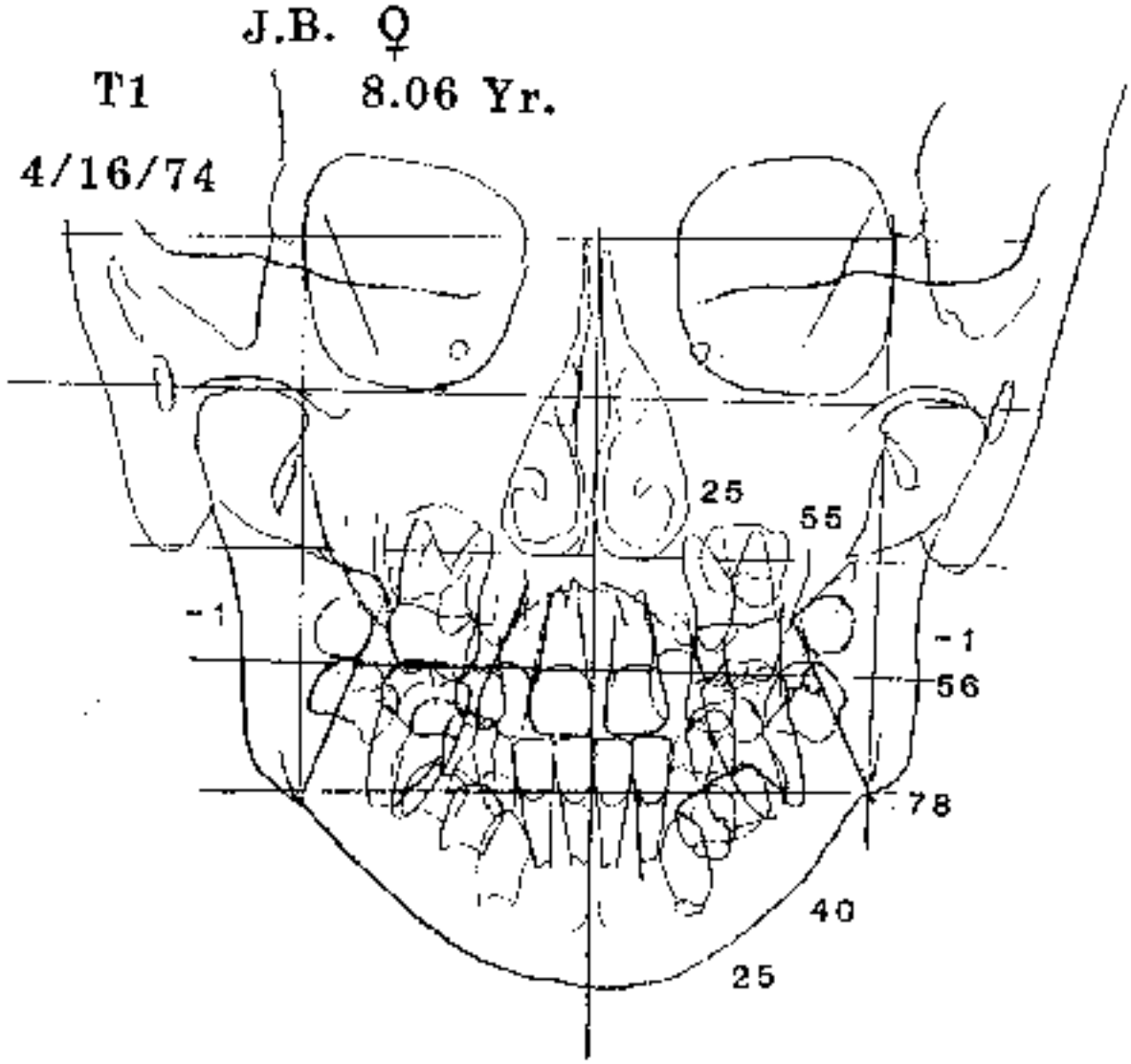
Photographs on an 8.0 year old female with Class II open bite. Note fullness of the upper lip.

FIG. 11-19-I



Class II open bite with high mandibular plan angle (35°) and 65° total height. High convexity of 7 mm. was present.

FIG. 11-19-ii



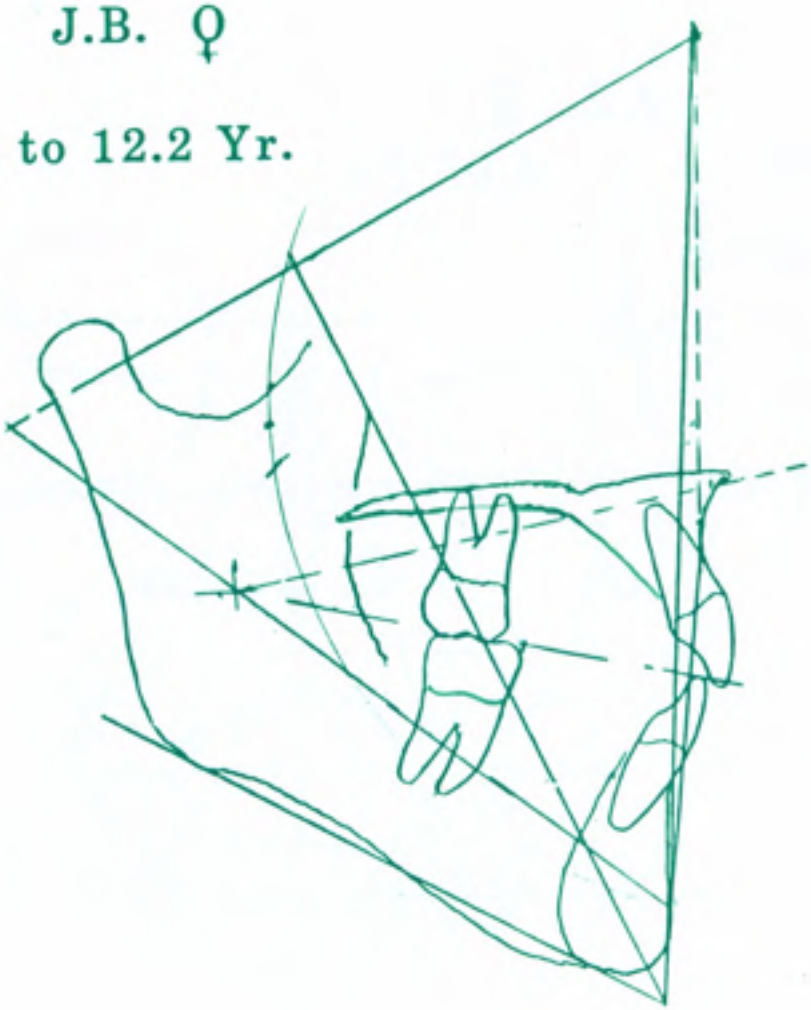
Case J.B. 6 year old female.
Normal nasal width and denture widths were present.

FIG. 11-19-iii

J.B. ♀

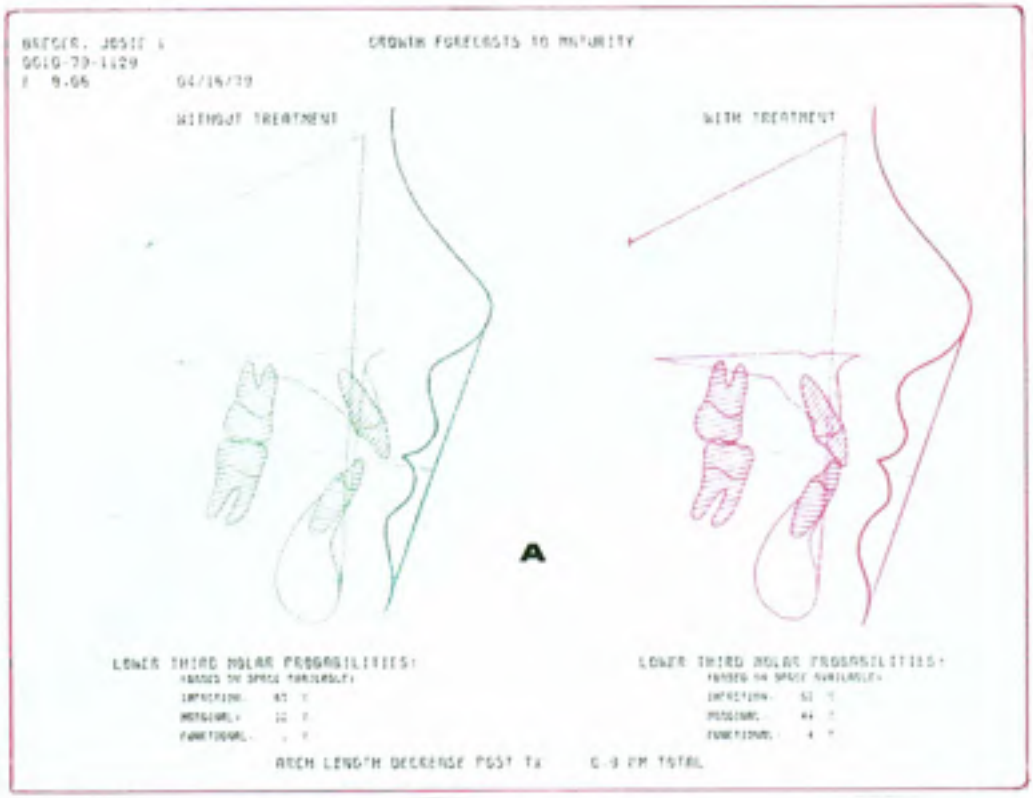
Forecast to 12.2 Yr.

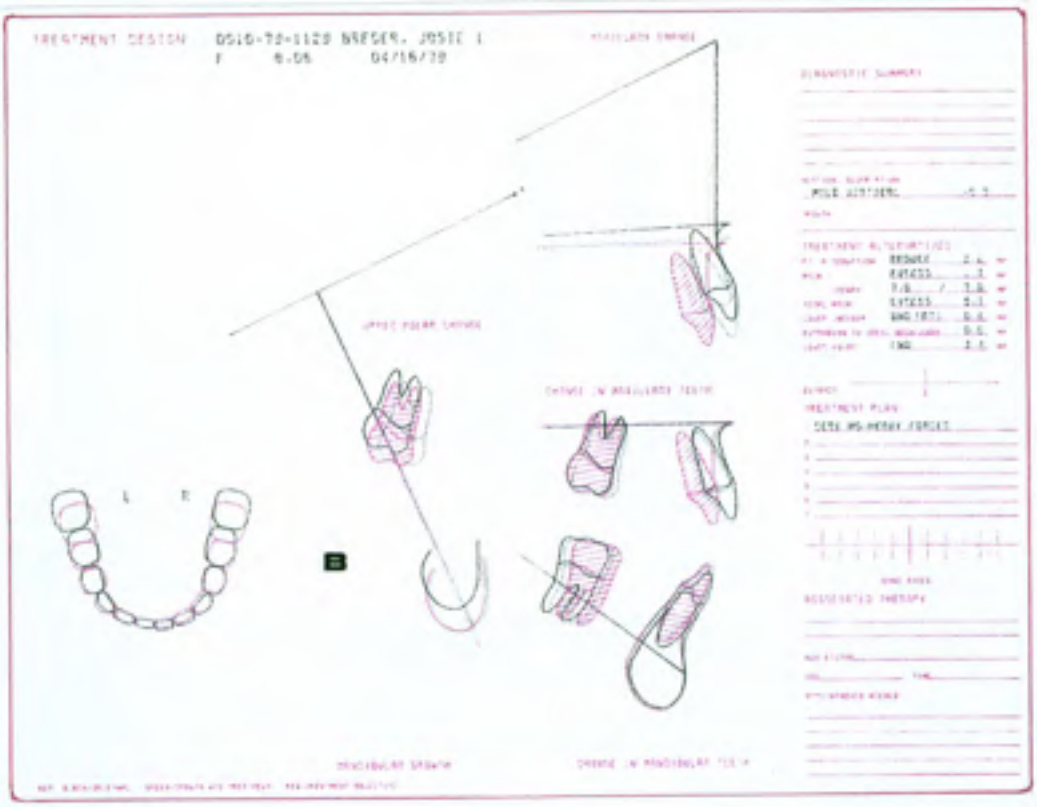
VTO



J.B. Forecast to only age 12.2 because it was the last x-ray available.
VTO – objectives at age 12.

FIG. 11-19-iv





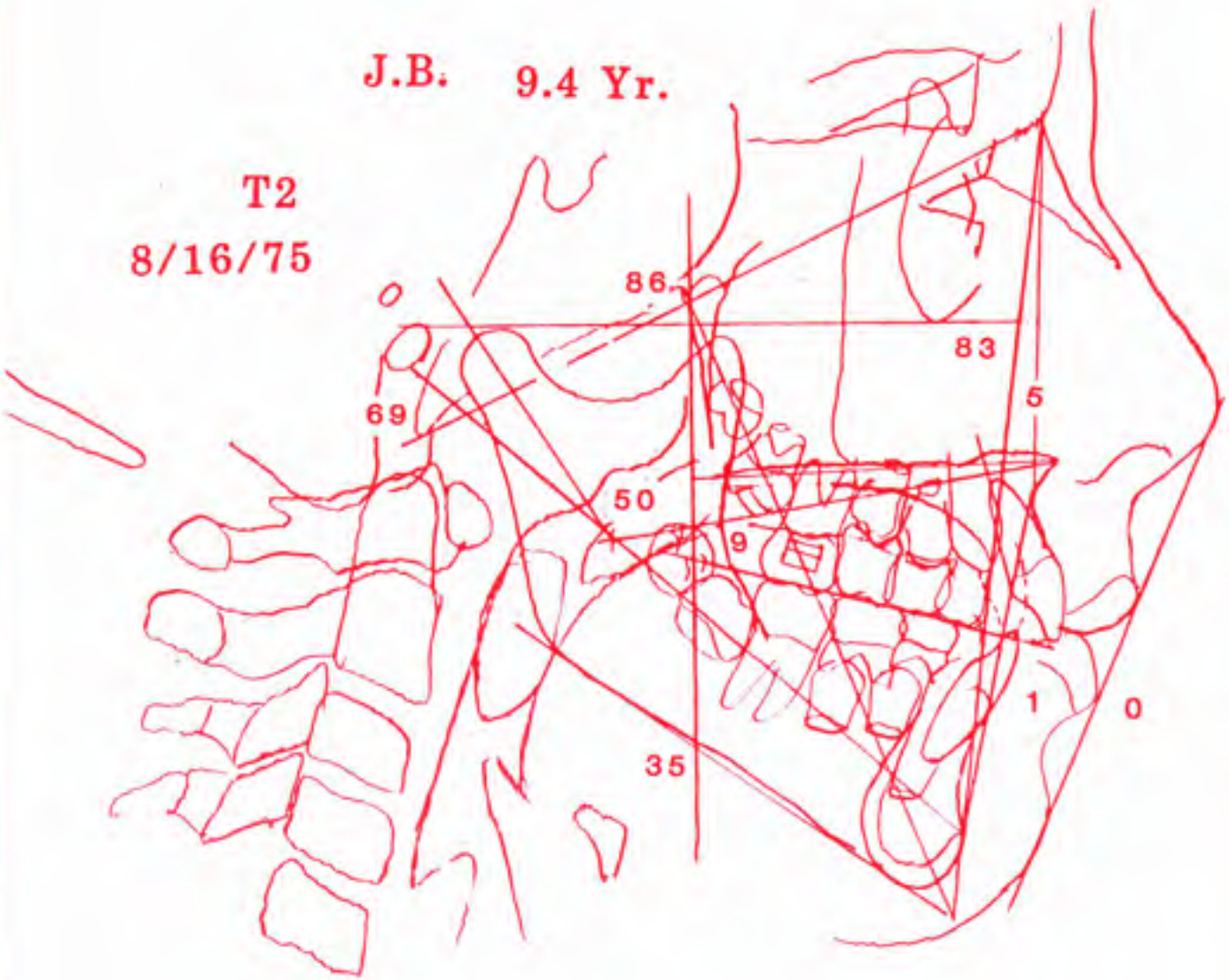
A. (Green) – forecast Computer Service workups without treatment.
(Red) - VTO.

B. Arch form projection – Note no change. Four Position Analysis showing maxillary orthopedics and upper incisor retraction.

FIG. 11-19-v

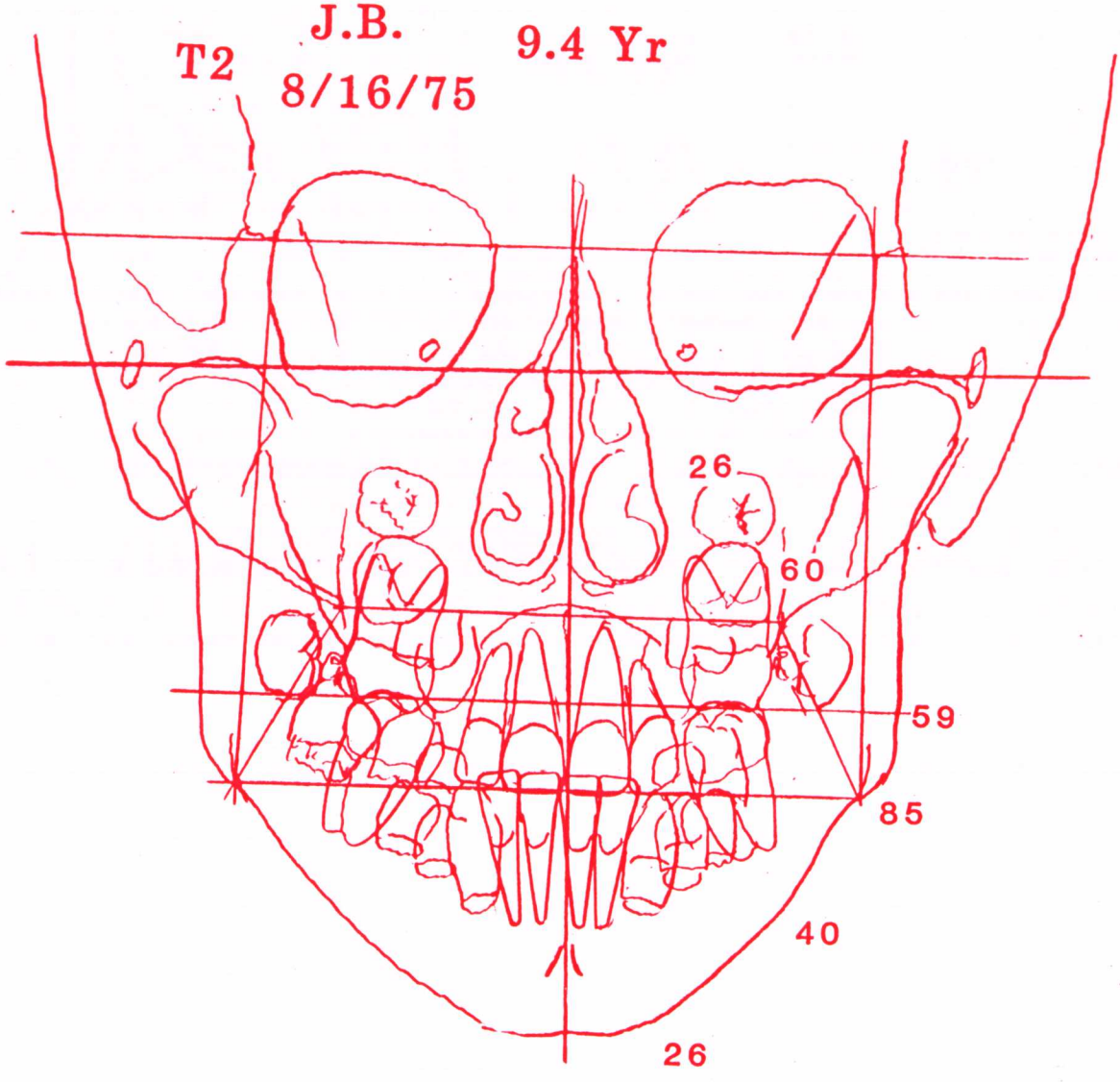
Facial photo with high-pull face bow.
Dr. Ricketts quit using this direction of pull in the 1970's

FIG. 11-19-vi



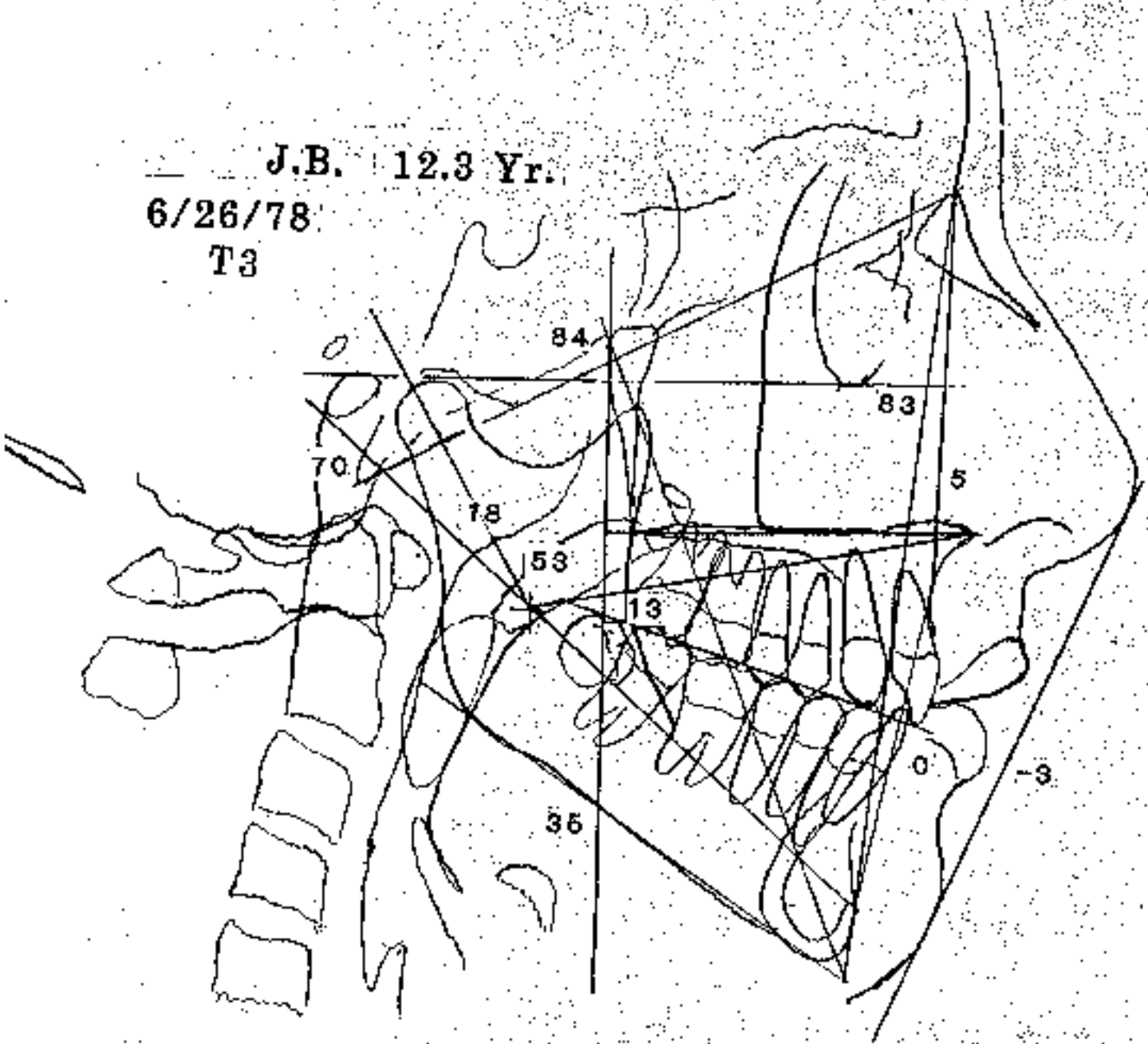
T2 J.B. after one year of high-pull night only. Bite is closer but mandible is rotating open. Two bands only.

FIG. 11-19-vii



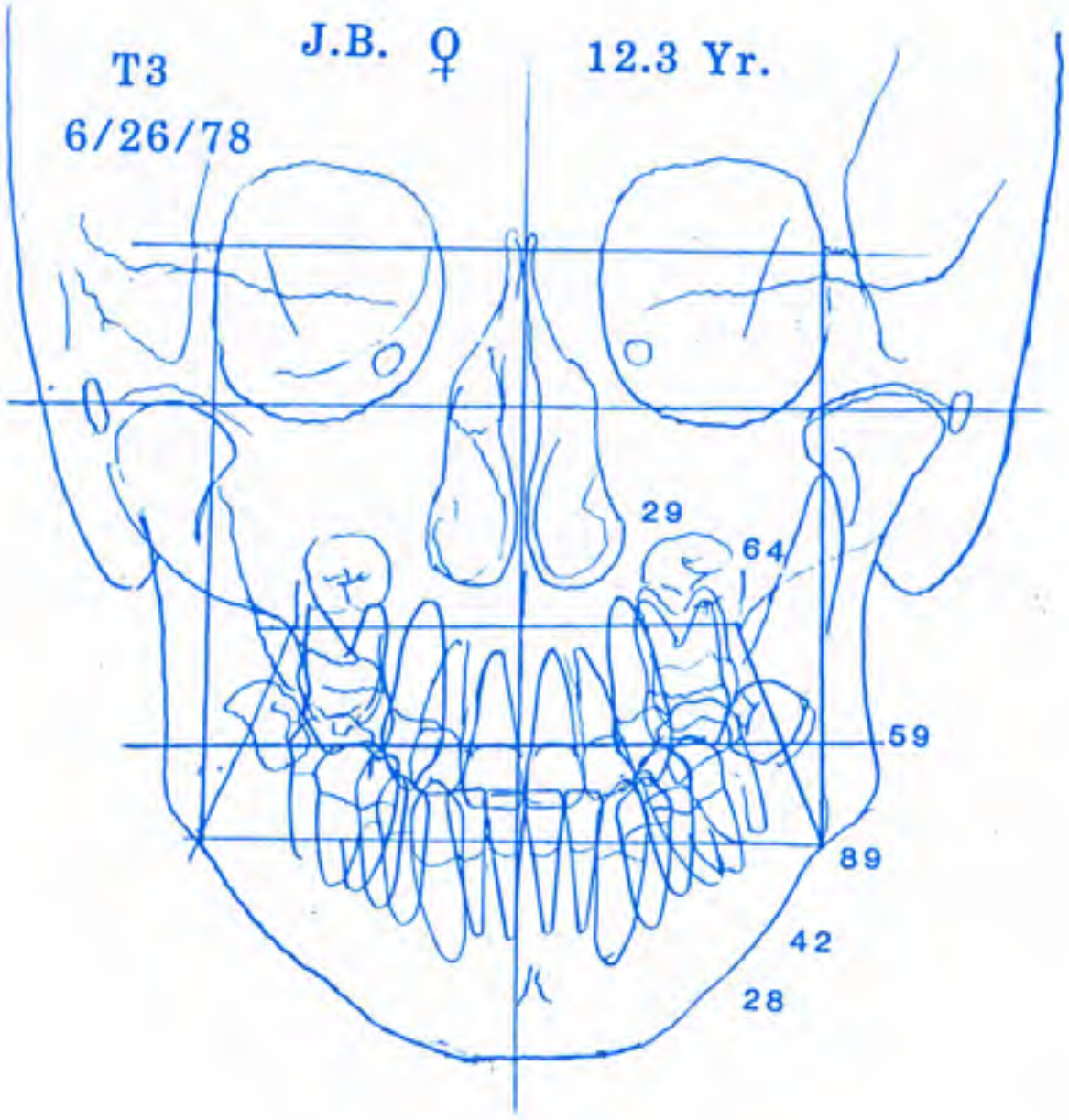
T2 J.B. Frontal after 1 year of high-pull.

FIG. 11-19-viii



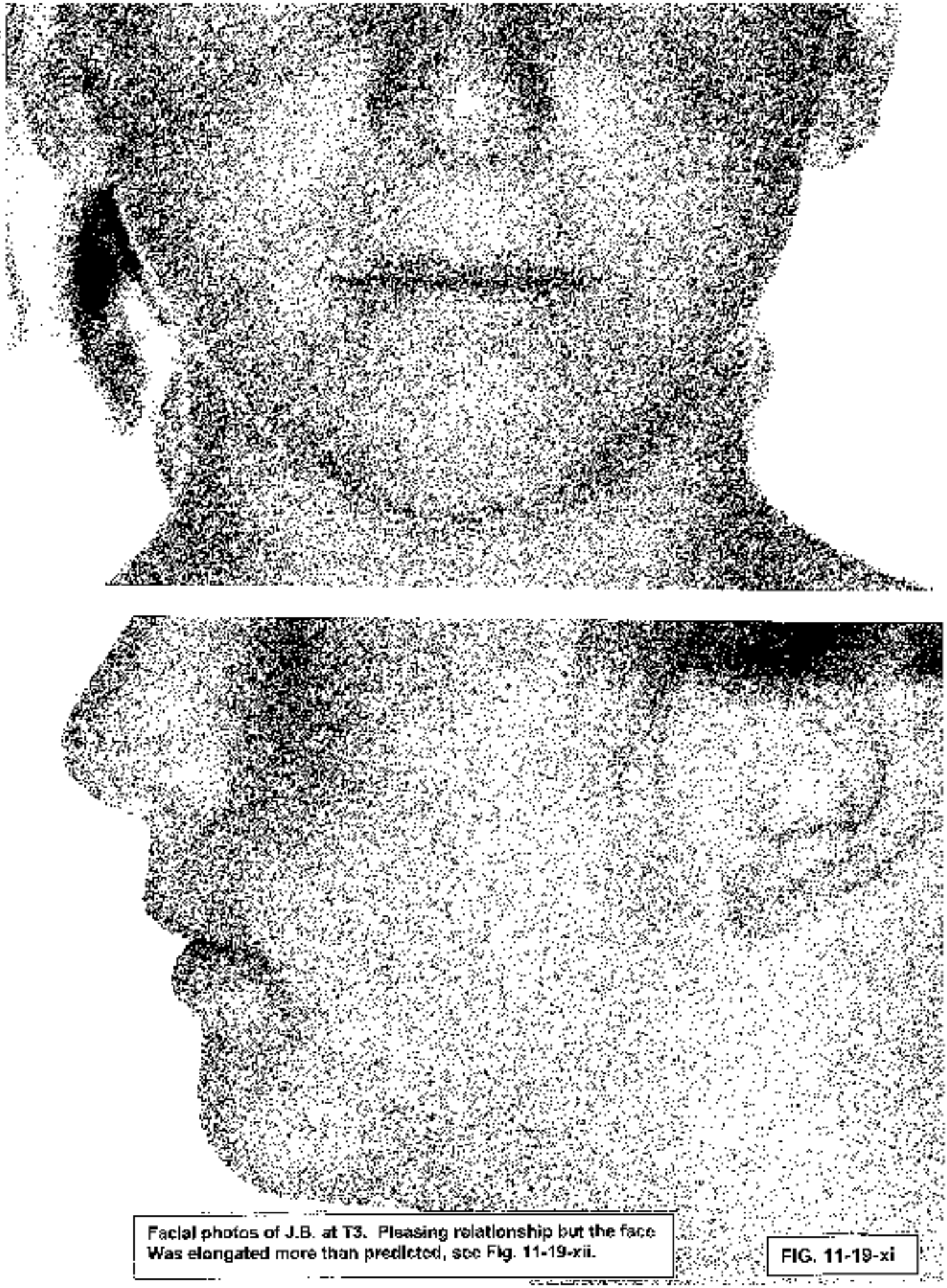
Case J.B. T3 bite is closed but by the tipping of the palate and upper incisor extrusion.
Mandible continued to open by whatever process. Compare to forecast.

FIG. 11-19-ix



J.B. Frontal at T3. Shows normal dimensions.

FIG. 11-19-x

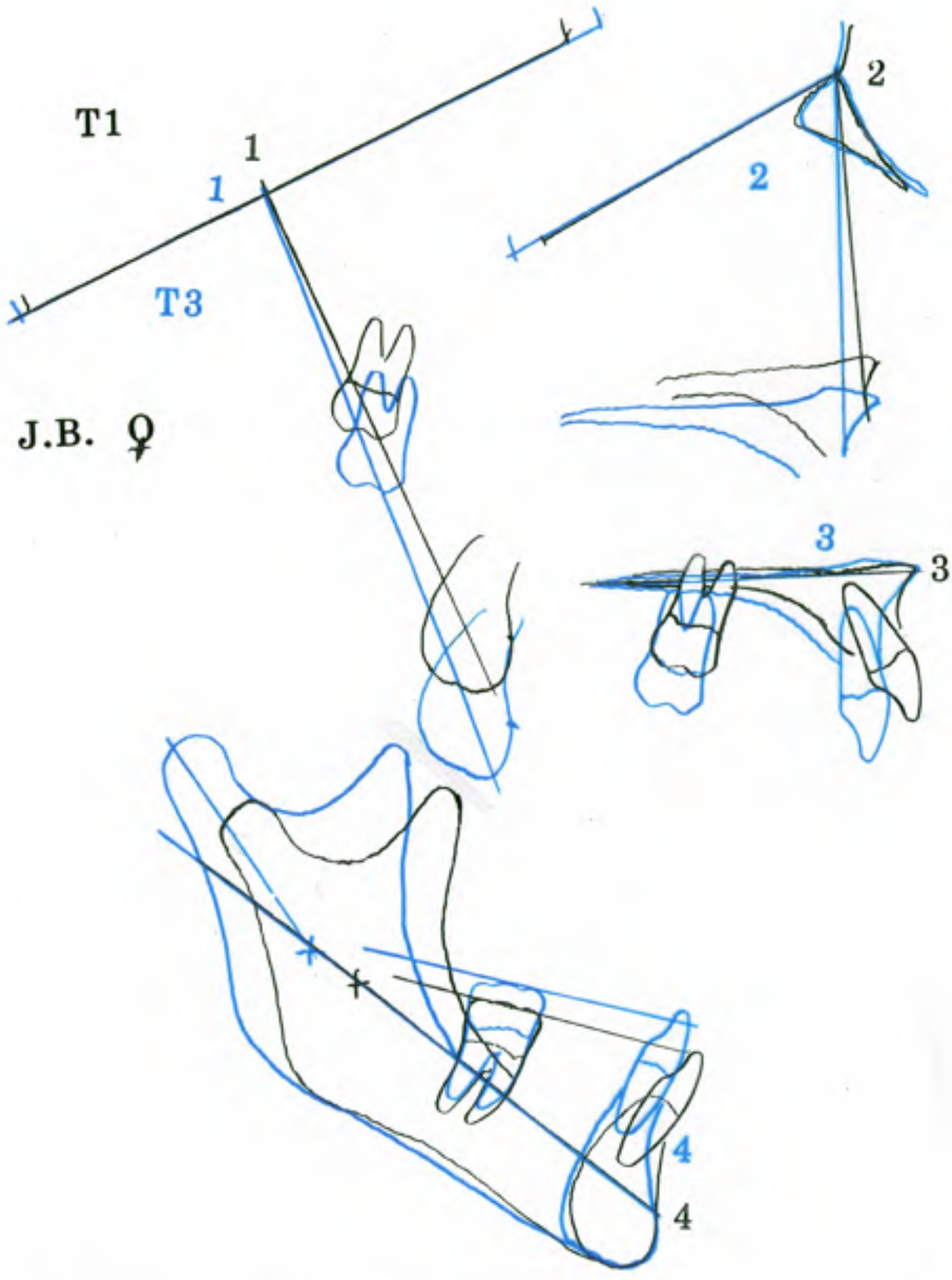


Facial photos of J.B. at T3. Pleasing relationship but the face Was elongated more than predicted, see Fig. 11-19-xii.

FIG. 11-19-xi

T3 comparison to the forecast. Note the mandible is quite exact but the rotation of the mandible actually was opposite to the "hi-pull" theory.

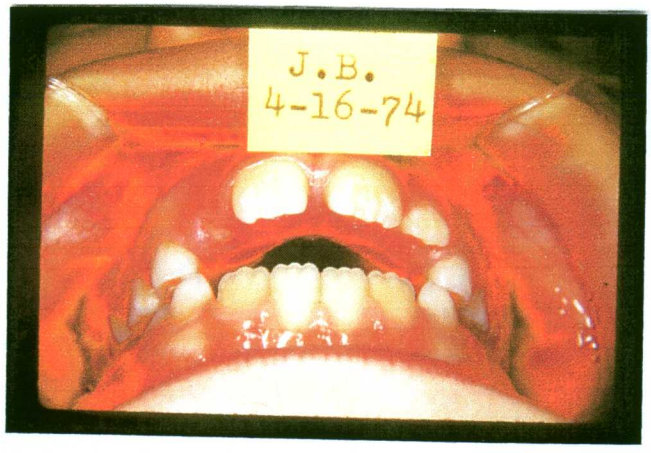
FIG. 11-19-xii

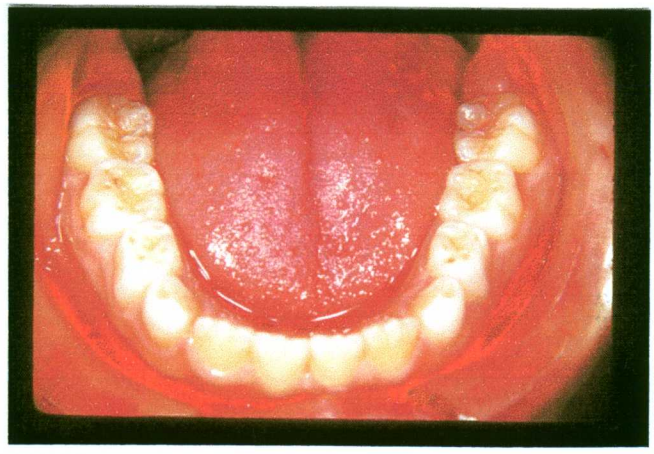


J.B. at T3 compared to T1 with the Four Position Analysis. Note orthopedics and orthodontics but upper incisor extrusion. Lower incisor was directed lingually.

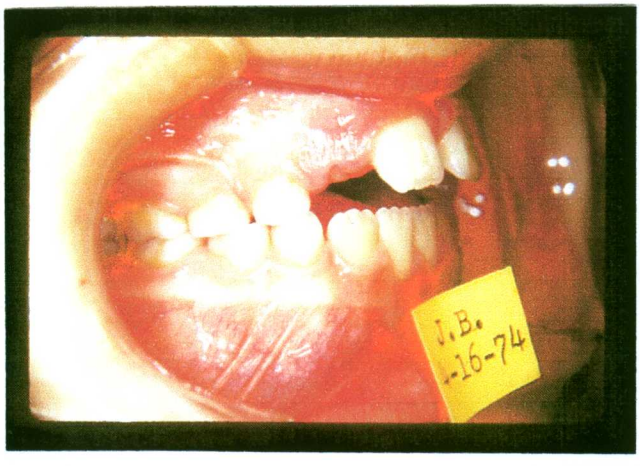
FIG. 11-19-xiii

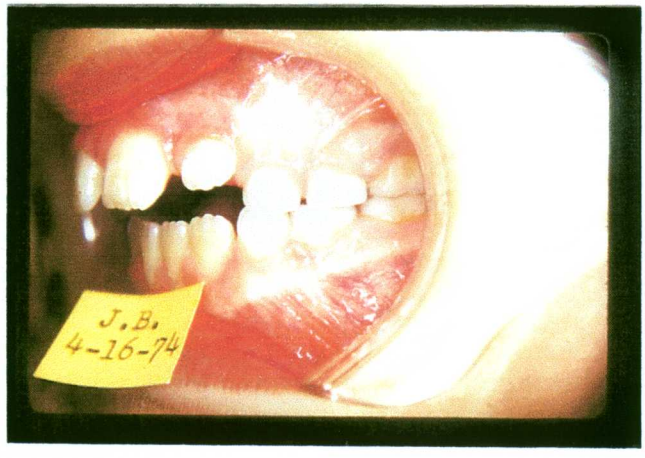
A



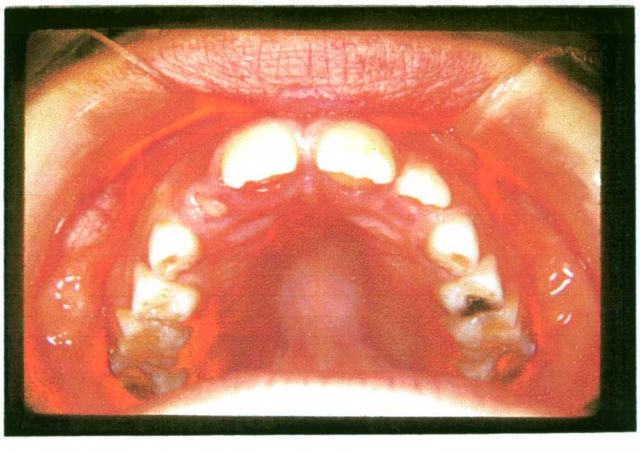


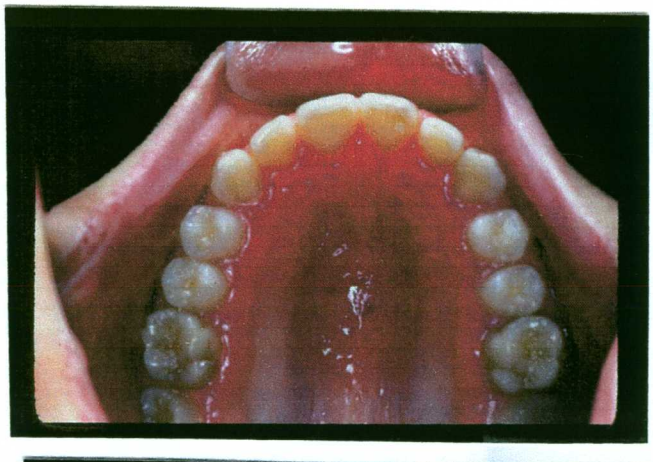
B



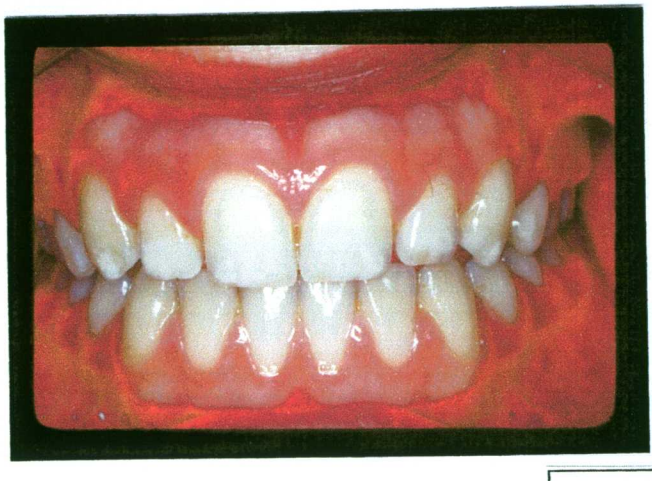


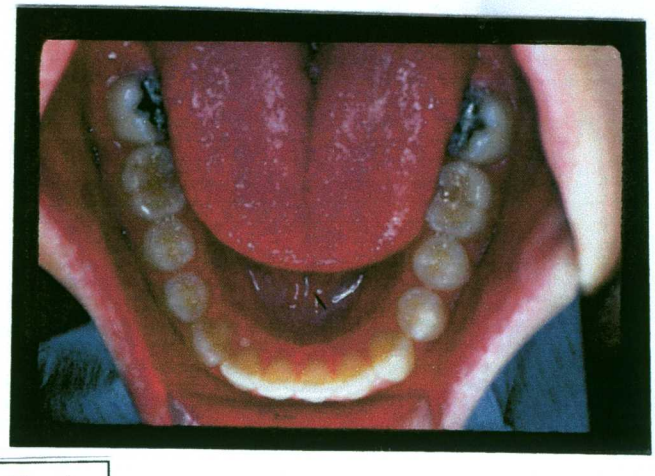
C





D





Case # 19 - 1

LEGENDS FOR CASE # 19

Case # 19 – 1 J.B.

A&B. Open bite, slight Class II, Division 1 but appears in the mouth to be Class I. The lower arch is good.

C. Before and after occlusal views.

D. Frontal finished condition and therapeutic ideal lower.

Class I and Class II patients with lip problems and crowded or retruded lower dentures were demonstrated. Extra oral traction and intraoral traction were employed in both types of patients. The results were shown in long range.

Problems and treatment in the transverse dimension were demonstrated. The palatal jackscrew and the quad helix were compared. On the basis of experience, the jackscrew was discontinued in favor of the quad helix.

Finally, there is a place for "serial extraction" which is not always serial or followed by premolar extraction. One patient was shown to have the deciduous canines removed followed by expansion with no extraction for creating space for permanent canines.

In two other patients, true serial extraction was practiced. One patient was started in the deciduous dentition and late extracted at the permanent level.

The long range forecasts **in all the patients** proved to be valid and useful beyond doubt.

In support of these findings excerpts of an abstract of a paper published in the American Journal of Orthodontics in July 1981 by S. Baumrind, et. al., is offered. The hi-pull group were significantly less in mandibular growth than the control. The cervical group grew significantly more than the contro group particularly in ramal height. This meant a doubly significant difference between cervical traction and hi-pull (Fig. 11-20-I).

This also fit with Ricketts' findings reported in 1960 which are shown on Table 11-1.

Sheldon Baumrind, D.D.S., M.S.,*
Edward L. Korn, Ph.D.,** Robert Molthen, B.S., D.D.S.,***
and Eugene E. West, D.D.S.****
San Francisco and Los Angeles, Calif.

Am. J. Orthod.
July 198.

Rates of change for the nine linear measures were computed separately for samples of subjects treated with cervical face-bow, high-pull face-bow, and activator type intraoral appliances as well as for a control group of untreated Class II subjects. Statistically significant between-treatment differences which we believe are large enough to be of clinical importance were detected for several measures.

As compared to the control group, a statistically significant rate of increase in condyle-pogonion distance was found in the intraoral group.

To our considerable surprise, the cervical group exhibited a similar statistically significant rate of increase in condyle-pogonion distance

In general, rates of increase in measures of anterior face height had higher values in the cervical group than in the control group.

The cervical group also exhibited a statistically significant rate of increase in ramus height.

In the high-pull-treatment group, rates of increase in ramus height and condyle-pogonion distance were significantly lower than those in the control group and rates of increase in lower face height and anterior face height were significantly lower than those in the cervical group.

This is an abstracted abstract of article in July A.J.O. by Baumrind et al. Note findings difference between cervical and high pull. This together with seven other disfavorable conditions led to discarding of the high pull in favor of cervical traction.

FIG. 11-20-i

TABLE 11-I

CHANGES IN THE MANDIBLE AND THE CHIN

50 cases each

	Facial Angle			X Y Axis			S N Pog.			Condyle Axis			S G N	Increase
	B	A	C	B	A	C	B	A	C	B	A	C	Q	Per year
Class I Non Treated	85.7	87.2	1.2	3.64	2.6	-.5	77.6	78.7	1.08	-.4	2.5	-.9	7.5 (32)	5.2
Retro (11 cases)	84.1	85.9	1.8	0	.4	.4								
Pro (22 cases)	87.4	88.6	1.0	6.1	6.9	.2								
Class II Non Treated	84.0	84.8	.8	2.4	2.0	-.28	75.1	75.9	.8	-.4	-.8	-.4	7.2 (30)	3.1
Div. 1 (21 cases)	84.2	85.2	.98	2.7	2.4	-.2	74.8	75.7	.8	-.8	-1.3	-.5	7.0	
Div. 2 (25 cases)	83.8	84.4	.6	2	1.5	-.3	76.37	76.20	.8	-.16	-.35	.05	7	
Retro (19 cases)	81.0	82.3	.6	0	-.7	-.7				1.1	-2.0	-.6		
Pro (15 cases)	86.6	80.8	.7	4.6	1.3	0				.6	.6	0.1		
Class I Head Gear (Neck Strap)	85.0	85.5	.5	3.6	2.0	-.9	76.3	77.1	.8	-1.6	-2.2	-.9	7.6 (37)	5.4
Div. 1 (36 cases)														
Div. 2 (10 cases)														
Class I (4 cases)														
Retro (15 cases)	82.2	82.9	.6	.5	-.4	1.0								
Pro (17 cases)	87.7	87.7	.1	6.3	6.4	2.0								
Class II Intermaxillary	84.7	85.4	.7	2.7	1.7	-1.0						-1.2	8.5 (30)	2.5
Retro (15 cases)	82.8	83.0	.2	-1.7	3.5	-1.8								
Pro (12 cases)	87.5	88.9	1.5	6.0	7.9	0								
Class II Head Gear and Elastics	86.0	87.2	1.3	3.3	3.0	-.3	77.26	79.3	1.2	-1.7	2.9	-1.3	9.2 (33)	3.0
Div. 1 (36 cases)	85.6	86.8	1.2	2.7	2.2	-.1	77.1	78.1		2.1	-3.4	-1.4	9.3	
Div. 2 (14 cases)	86.9	88.4	1.6	5.0	5.1	0	77.6	79.0		.5	1.7	1.0	8.1	
Retro (12 cases)	89.4	85.5	1.9	1	2	-.1								
Pro (14 cases)	85.1	86.5	1.4	7.1	7.1	0								
Mean	85.1			3.1			76.6			-1.0				4.0

LECTURE TWELVE – SUMMARY

TREATMENT OF THE YOUNG PATIENT

I VOLUME I - INTRODUCTION

- A THE SWINGS IN HISTORY
- B. THE WHOLE PROCESS
  - 1. Possibility
  - 2. Objectives
  - 3. Pitfalls
  - 4. Planning
  - 5. Classification as a Starting Point

II VOLUME II – TECHNIQUES

- A. MECHANISM FOR THE CHILD PATIENT
  - 1. Extra Oral Therapy
  - 2. The Helicos Appliances
  - 3. The Utility Arch
- B. PRINCIPLES OF BIOPROGRESSIVE
- C. COMPOSITES – THE VISUALIZATION OF DATA
- D. CLASSIC PATIENTS AND TECHNIQUES
- E. FORECASTING OF ANTICIPATION OF GROWTH

III IMPORTANCE OF FORECASTING

- A. WHO USES FORECASTS?
- B. ACCURACY OF FORECASTING
- C. HIERARCHY OF FORECASTS
  - 1. Major Case
  - 2. Minor Case
- D. NAÏVE MODELS
- E. TIME SERIES ANALYSIS
- F. OPPORTUNISTIC FORECASTING

IV FINAL DEMONSTRATION OF FORECASTS - Contribution of Dr. A. Haas

V. DELIBERATIONS

LECTURE TWELVE – SUMMARY
TREATMENT IN THE YOUNG PATIENT

VOLUME I - INTRODUCTION

These lectures are reported in two manuals for the aid of the student. The first volume is concerned with concepts and objectives of early treatment. A problem exists in semantics; what is early and late? What does it mean to be young and old? Orthodontists have grappled with the problem of the best or most proper time to start treatment for more than a century. The popular time, as set by scholars, was to be established when full banded or "control" appliances were developed. This led to a movement away from treatment in the deciduous or even the mixed dentition.

However, to fuel the movement to wait for the permanent teeth, an array of arguments were formulated by both educators and clinicians. There seemed to have been a competition develop in who could treat the fastest when delayed treatment was accepted. Active treatment durations were proposed for as little as 3 months. Even as late as the 1960's workers with Begg theories planned 6 month treatment objectives. If treatment could be successful in such short periods it was doomed unwise for the clinician to be up a practice with long drawn out management over a period of years. The emphasis turned away from the patient to the clinicians' interest.

When the limitations of orthodontic treatment were added to the logistic problems, treatment before all the permanent teeth had erupted seemed to be doomed from a logical standpoint.

A. THE SWINGS IN HISTORY

Yet history had revealed that swings had occurred in the past toward and away from earlier intervention. Arguments vascilated from growth stimulation to growth inhibition and the functional doctrine has never died. As the specialty turned away from the juvenile patient, the void was filled by general practitioners and pediatric dentists employing any appliance that they could handle.

The truth was that parents, on seeing glaring problems, even as laymen, wanted young children taken care of. Particularly as more orthodontists wanted to take more teeth out and more wanted to wait for orthognathic surgery, the public began to become skeptical as well as many of the generalists.

By the 1950's and 1960's the advantages toward earlier starting ages were being recognized. Four choices became obvious to the clinicians practice. The first was that the child was not even to be seen by the specialist. The message passed on to the general practitioner was that the patient "is not yet ready for treatment". The second choice was that the child could be seen by the orthodontist and records could be taken almost as a marketing move. But little treatment was indicated until "growth was given a chance".

The third choice and one followed by many traditional clinicians, was to relieve crowding of the incisors by serial or progressive extraction. This was generally under the premise that only the alveolar process could be altered and that the "ridge" must be adhered to.

The final choice was to treat the child. All but the most extreme Class I conditions were therefore to be expanded. Class II and Class III were to be treated orthopedically. The theme of this series of twelve lectures is to explain and document the possibilities of corrections for the juvenile patient.

B. THE WHOLE PROCESS

With the development of the computer as an aid to management and as a diagnostic aid, the view toward clinical practice changed. It largely was divided into three areas; diagnostics, socio-biologics and mechanics (see Fig. 0-1 and 0-2). But diagnostics became much more than diagnosis. It included making the prognosis, the rendering of a forecast, the making of a statement of objectives and the actual treatment designing. This was therefore redefined as the determination resolution process (DRP). Diagnosis is the determination of the nature of the condition and the resolution was worked out on paper for a VTO or a VTG.

However, the clinician could not go directly to mechanics without passing through "Biologics". Growth, tissue response, possibility and feasibility as well as risks are tempered in biology. These loom loud and clear in the child patient whose future is at stake. Esthetics, occlusion itself, and management of individuality are significant in biology, hence sociobiology.

Mechanics speaks for itself. However, several modalities need to be mastered because edgewise straight wire cannot be practiced until the permanent teeth are present.

1. Possibility

From serious research with cephalometrics and with observations by active clinicians, there developed a "doctrine of limitation" by workers in the orthocontic field. With reinforcement, this idea became a dogma which became emotionally defended. It penetrated almost every aspect of clinical practice.

Probably more than any single worker, Ricketts challenged issue after issue regarding those theories. In 1968 at least two dozen axioms were found

unacceptable and published as "Public and Professional Relations". As new methods of registration cephalometrically were developed and new findings emerged, and as a forecasting matrix was discovered the old theories were challenged and began to fail. As techniques were applied in a different manner, new possibilities became obvious. Reliable growth forecasting became a reality.

Structural change was found even to include the whole temporal bone or the cranial skeleton as well as in both jaws when certain practices were conducted in the juvenile population. Intrusion of teeth turned out to be the easiest of all movements. Safe and stable expansion was proven and distal movement of molars was routine even in adults. However, cortical bone anchorage, and sectional mechanics, became a **departure from the fervor of maintaining a continuous wire at all costs.** Third molars were enucleated when a proven prognosis showed the odds to be pitifully small for their eruption and function.

Lip surgery, for release of tension, changed the odds of relapse. A therapeutic perfection in the arrangement of teeth also added to stability and beauty of results. Methods of correcting joint derangement were developed.

2. Objectives

Based on the possibilities seen in single patients and the probabilities revealed by data of groups of classic patients, new and more extensive objectives could be expected. The computer was programmed to produce the VTO and the VTG as standards in the profession. Long term esthetics and functional equilibrium could be envisioned before treatment was even begun!

The recall of patients and the obtaining of records provided documentation of the long term effects.

3. Pitfalls

No treatment is without risk. Often a clinician may go on and on with a scheme or a preferred method without monitoring the condition developing. Particularly in young patients there is either a tendency to undertreat or not knowing when to stop and letting nature take over. It is as important to know what not to do as it is to know a particular method.

4. Planning

The secret of Bioprogressive Art and Science is the phasing and staging of sequences. Phasing refers to timing and may be interrupted. Staging is a continuum, but a change in operation. **Planning is the production of a schedule of operations to be made**. Actually Bioprogessive practice includes a part of many modalities. It may use a part of the functional philosophy. It may have some of the features of the labio-lingual theories. It contains elements of the Crozat approach. It started with standard Edgewise and was modified by some of the theories of Begg.

The problem encountered in communication is that Bioprogressive is not a particular technique. It is an application of numerous mechanical and biologic principles and it uses science profoundly.

5. Classification as a Starting Point

Without saying much about it, for programming the computer the author classified molar relationship **from the lower molar**. The reason for this became obvious with the construction of the VTO.

Classification has as its usefulness the reducing of a number of items so that they can be managed as a single entity. Very common for instance, is the

large, medium, and small – a three parameter system that can be easily handled by most minds. A five parameter scale is a little more difficult. However, the bell curve with standard deviation is actually a seven parameter event. For this reason and others, the computer comes into play. The handling of massive data is its trademark. The younger generations consider it a part of daily life.

But classification of other aspects of orthodontics is useful. This includes the normal and abnormal **lip conditions**. It entails a classification of normal and abnormal **tongue** activity. Further of interest, is the classification **of dysplasias of the face** and syndromes of morphology and function.

Of great value further, is the classification of **joint conditions** that may be associated with conditions of the occlusion. The author considers it be utter nonsense that occlusion and joint function are considered by some to be completely independent. It is totally unbiologic to think otherwise.

II VOLUME II - TECHNIQUES

While the first volume of lectures dealt with basics, and the diagnostic and prognostics elements pertaining to the juvenile patient, the second volume of subjects considered the actual treatment and various and methods' capabilities.

A. MECHANISMS FOR THE CHILD PATIENT

When total orthodontic and appliance regimes are considered about thirty different devices are employed. In the juvenile patient (age 3 to 10) the primary objectives are **structural change**, functional **adaptation, the employment** of **growth** and the enlistment of the **natural forces of occlusion.** Therefore only three principle appliances constitute the authors general approach to early treatment.

1. Extraoral Therapy

Because orthopedics is a goal, the first modality is extraoral therapy. This is "cervical traction" for Class II management of the second deciduous molars at age 4 or 5 years and "face mask" for the Class III. The first permanent molars are used after age 7. The appropriate forces were explained. Corrections start with the molars which are "handles" for the upper jaw.

2. The Helices Appliances

The second appliance is the quad-helix (and the bi-helix for the lower). The author prefers the soldered variety. The removable quad-helix with the Crickett design or bi-helix for the lower is included in this category. These are employed for Class I or mild Class II. They can be either expansion or contraction devices.

3. The Utility Arch

The third appliances is the utility arch. Treatment is conducted with the blue Elgiloy .016" x .016" wire in .018" preadjusted Ricketts bracket and toe formulas. Intermaxillary elastics are employed with this apparatus which can be applied to both arches. Sectional mechanics also associates with this approach.

Mastering these three mechanisms will help the operator appreciate the possibilities in young children. Early treatment is thus simplified.

B. PRINCIPLES OF BIOPROGRESSIVE

Forces, in the final analysis, must be reduced to their application to unit areas. This fact means a consideration of pressure. Clinical and laboratory research support the idea of one gram per square mm. of en face root surface

as optimal for movement and **differential anchorage**. A root rating system was worked out which has stood in good stead for three decades.

However, when anchorage or ridge change is required, two alterations are employed. The first is the engagement of compact bone referred to as "cortical" anchorage. The pressure is doubled or tripled for this function.

Probably least understood and applied is the modification for "ridge building". When alteration of the alveolar process is desired, such as in expansion or anterior tooth retraction or protraction, the force against the alveolar crest should be 0.5 grams per mm^2. This suggests that **gentle pressures** applied are indeed several times less than that of traditional practices of the past. The new bone comes from the periosteum on the outside of the alveolus.

C. COMPOSITES – THE VISUALIZATION OF DATA

In the author's personal experience, the computer use for the convenient production of composites of normal growth control groups and samples of treated patients was a true breakthrough in clinical science. Tables of data are only understood by the investigator as a rule. Direct visual comparison of groups of treated subjects quickly and accurately portrays differences produced by various modalities. When the first samples are matched and the composites of the results no longer match, there should be no debate.

When long term composites are made available, the permanent effects of a given treatment regime can be assessed. Long term studies are indeed rare. Seventeen samples of patients have been studied by composites of mandibular posturing methods of three in long term.

Almost as many have been studied following extraoral traction and combination techniques. Data on several hundred patients have been gathered and processed. The findings represent solid science.

The clinical findings are especially valuable when the data of normal behavior and normal range of behavior has been verified and reverified for the past 30 years.

In 1999 thirty-five children with treated Class II were studied in short and long range to maturity. These were broken down into deciduous and mixed dentition and open bite and closed bite. They were reported in Lecture Nine.

D. CLASSIC PATIENTS AND TECHNIQUES

For the answer to questions regarding care for different types of juvenile malocclusion conditions eighteen patients with long term records were exhibited. They were divided into seven groups as an aid for teaching.

Some children were treated in the "preventive" classification. Certain of these had previous records to show the growth behavior first, and the treatment differences as a comparison.

Others were started in the mixed dentition or interceptive phase, in order to demonstrate the behavior after age 7 years.

It is interesting to note that the patients started with the upper second deciduous molars as anchorage were safely completed at an age before the mixed dentition patients were started.

E. FORECASTING OF ANTICIPATION OF GROWTH

Because of the need for the anticipation of growth in the child patient the author includes a discourse on Forecasting as perceived in 1983.

The dictionary will tell us that "prognosis" is the foretelling of the probable course of a disease, or a forecast of the outcome of a disease. Forecasting further permits "to plan in advance". Forecasting attempts to foresee or seek to predict future events. Therefore, the word prediction, although it has a degree of finality, has been used interchangeable with forecasting in many branches of endeavor.

III IMPORTANCE OF FORECASTING

This was a miscellaneous writing prepared in March 1983 but it seemed pertinent to the discussion.

Forecasting is required in all situations where a **current decision has future implications.** Most of the clinical decisions an orthodontist makes rest on explicit or implied forecasts even if its the movement of a single tooth. We plan treatment on the basis of what we think a particular appliance will do and the manner in which we have used it in the past. The clinician reacts to minute forecasts by having expectancies of each adjustment. It has never been more clear that the best decisions depend upon the quality of the forecast

There are three aspects to clinical forecasting. The first is the prediction of the natural growth and developmental changes. The second is the objectivizing of the possible changes that can be induced both orthopedically and dentally. The third is the growth and treatment behavior of the soft tissue which becomes a serious factor.

Some minor decisions are relatively routine and involve only small changes. These can be based on simple assumptions that the future will be like the past. However, **short run decisions accumulate into long run courses of action and may commit to large errors.** Improvement therefore, can be made even in short-term decisions from a more formal forecast. It would seem obvious that good forecasts, therefore, offset the cost of making the forecast. They have improved with the availability of (1) computerized cephalometrics, (2) the findings of facial growth of the mandible and (3) the allometric behavior of several parts of the face. It is solid and logical that clinical orthodontists, sophisticated in the field, use forecasts on a routine basis.

Like an expert artist, a skilled forecaster must be a splendid technician. Scientific tools help the good artist to become great forecasters. Anyone capable of selecting anatomy on a routine headfilm and schooled in its structural details, should be capable of forecasting. Forecasting procedures are also put on the computer.

A. WHO USES FORECASTS?

Most every business, agency or institution has a need for and employs forecasting. Forecasts are the bedrock of the insurance industry. Forecasting starts with the **adequate collection of data.**

Long-term forecasts are necessary for the planning of any business changes. Today's decisions for major changes affect future courses of action to be taken and will have a bearing on the outcome. Orthodontists may erroneously assume that they can take out teeth and selectively burn anchorage and get by. That is pure experimentation. The number of incompleted orthodontic cases with spaces opening between the teeth, the relapse of deep bites, with lower crowding sometimes approaching the original condition less four teeth, the

number of flat mouths by the time that maturity has been reached, and unsightly esthetic results all bear witness to a sloppy attitude on the part of many in the orthodontic profession.

In this day and age these conditions should be of concern to all those in graduate and undergraduate education **whose job it is to teach the standard for dentistry as a whole**. It should be a wake up call for those clinicians presenting themselves as leaders in the field or who assume the role of the standard bearer. There is a real dearth of studies that contain long-term results with **comprehensive analysis**. Some would choose to select isolated failures to disprove forecasting. This is one viewpoint. Why not rather take good samples and see what the long-term effect of growth and physiology changes actually reveals through the application of composites which are not anecdotal.

B. ACCURACY OF FORECASTING

The accuracy required in a forecast depends upon the use to which the forecast is to be applied. If a forecast is not useful for a utilitarian purpose, it is just an academic game. To be of importance, **it should aid in the making of a treatment decision**. Each user should have the ability to react to unexpected events in case of the forecast being in error. Thus, a forecast of normal growth of the mandible for the individual when compared to the true event will reveal undergrowth or overgrowth or dysplasia behavior. The forecast will suggest possible damage to the growth mechanism in the individual where they were unforeseen in the beginning. The orthodontist should be able to immediately react to growth or behavioral problems particularly when they concern the temporomandibular joint. Condyle damage iatrogenically or systemically may alter the future course of treatment. Furthermore, good forecasts can be used to show to the patient and parent as a concrete presentation rather than a complete etherial abstraction of possible outcome.

To test the accuracy of our method, please take the patient prediction and compare it to the actual **on a percentage basis**. For instance, say the predicted growth on the Facial Axis is 9 mm., while the actual was 10 mm., the accuracy of that prediction, in that given time, was 90%. Such an analysis is good for linear measurements but is difficult for appraisal of angular measurements in cephalometrics. For instance, a miss of one degree in the direction of the Facial Axis, since the origina. prediction, was no degrees, would be an error of 100%. Therefore, there must be another consideration in evaluating the accuracy needed when it comes to prediction of angular measurements. Having taught cephalometrics for four decades, it has been found that the accuracy of cephalometrics itself frequently varies one degree or one millimeter or more due to the **inability of everyone to select the same cephalometric points**. This includes connecting these points with pencil lines. Therefore, new objectives are required for common sense.

Among clinicians there is a wide range of conflicting opinions ranging from those who simply do not care, or have no opinion at all, to those who claim that for a forecast to be accurate, to be useful, must be completed with absolute certainty. However, in the end, if the forecast can help make a correct decision with regard to the clinical situation, then it becomes useful.

The graphical display is a method of assessing accuracy rather than viewing charts filled with statistics. A quadrant graph method can be used as is employed in business and industry. However, in cephalometrics, we have almost a perfect form available in the normal 90 degree Facial Axis from the basicranial axis (BaN). Another quadrant root type of display is available from the pterygoid vertical to the Frankfort plane. This gives us, in the lateral film, not only one but two methods of assessment of angular change. In addition, an arc for the growth of the **mandible** serves as a graphic display and it is a human base on which calculations can be applied for forecasting.

C. HIERARCHY OF FORECASTS

Forecasts are capable of being considered in the extent of their magnitude and importance. Microforecasts may be considered those of individual tooth movements based on the activation of a given spring or the results of an elastic force. An example might be the predicted millimeters of movement in a 30 day period. Also the term **miniforecast** can be used as it would apply to small distance and short-term forecasts. Designs for the actual treatment experience is a usual two-year duration. Tooth movements due to ordinary eruption and development over a two-year period might also be considered **microforecasts.**

Tooth movements induced by treatment particularly in severe malocclusions, might be considered **macroforecasts.** Large distance and long-range forecasts are those extended from childhood to maturity. If it's a two-year forecast, it's a microforecast or a VTO. This means then that anything three years or more with the forecast would be delegated within the consideration of a "macro" character at least for semantic purposes. Another interesting interpretation might be that the long-range forecast with idealized results might be considered a **macromodel** as a part of the objective. We shall call this a VTG (a visualized goal).

It would seem prudent for those in the profession of orthodontics to employ forecasting techniques on a routine basis. This is useful in the field of marketing and business production and in anticipation of changes in the economy. The orthodontist needs imagination and ingenuity in order to determine exactly how forecasting techniques can fit the clinical situations. In the past, the profession has not taken advantage of forecasting (or they have not been applied to marketing problems). Neither have they been applied to our problems in communication. They have not served as a feedback to our actual treatment methods. Perhaps orthodontics has not as yet grown up to this level or sophistication. Will professionals sit back and fail to realize the significance until

enough colleagues actually start to use the technique and the bandwagon effect takes over?

1. Major Case – Different Hierarchy of Methods

Let us now discuss different sophistication of methods and hierarchy of methods of forecasting.

2. Minor Case – Naive Forecasting Methods

The label naive is applied to forecasts obtained from only the historical values of the variables to be considered. No attempt may be made to examine or recognize relationships with other variables. **Such is a forecast on the mandibular plane angle**. The value of this forecast is that it is inexpensive and quick. The clinicians simply proceed as if the future will resemble the past (or the last period observed). In business, this would be anticipation of the status quo. It would be based on the last month, the last quarter or the last year in terms of projections for the future.

In some instances, the naive forecast serves as a standard for comparison. This would mean that it might be used in an effort to determine what would have happened under normal circumstances in a given situation. Complex forecasting techniques indeed should be rejected unless they can improve upon the naïve forecast.

In a questionnaire sent to orthodontic societies, we found that well over 90% of all orthodontists insist that they are using predictions. On further query, most of them are using the naïve forecast. It takes the form of forecasting the future behavior of a "pattern". They seem to have in their mind a distinct problem forecast with the high mandibular plane when combined with an open bite. The details of the prognosis, however, are not determined. The user of the naive

forecast draws conclusions on the basis of patterns rather than to become involved with more complex and more sophisticated details. Naïve forecasts are without any specifics as to what may be done to manage patients in the various categories.

D. NAÏVE MODELS

A simple projection model might be made in which no formal statistics are involved. A more complex model may warrant a computer solution without knowledge memorized and without training and without a knowledge of different sexes and different constitutional types. The clinician by actual tests has found it difficult to manually produce a forecast that could well be done with a computer. Certain models (paradigms) have been used in business. These are divided into the time series techniques, the link relative technique, and the development of smoothing models which may be worthy of evaluation and consideration.

An example of simple models may be the assumption that the recent past is the best prediction of the immediate future. However, this model yields no guidance. There is no explanation and it does not stress or contain any importance to past or future periods. A simple formula may be used for this time series type of a model. It is a chevron over an X representing a forecast X . + 1 = Xt. The t is time and the actual is X. The difficulty of this type of a model is that the orthodontic treatment often affects the pattern behavior. This is particularly true of orthopedic changes in the maxilla in short and long term. The simple model forecast is thrown way off when iatrogenic problems of the joint are experienced.

Therefore another answer to the problem is to incorporate another trend into the projection model. This takes the form of chevron Xt – ' = Xt + (Xi – Xt – 1). The forecaster, therefore, uses the average of past absolute changes in preparing the forecast.

E. TIME SERIES ANALYSIS

In the time series analysis, the assumption is made that regular and repeating components react to produce a series. The task is to **identify the components**. The components clinically may be (1) the depth of the bite, (2) the amount of horizontal arch dysplasia, (3) the amount of convexity reduction required, (4) the age of the patient, (5) the sex of the patient, (6) the turgor of the condyle, (7) the type of treatment regime to be used and, of course, finally (8) a compliance schedule. This becomes a **link relative model**. The forecaster tries to predict changes in the time **series** rather than the variable itself.

In expedential smoothing, the forecaster uses a weighted **moving average** of past data as a basis for his prediction. Some factors are **weighted to be more effective than others**. This we have done both with the manual and the computer programmed predictions! This is more compatable to computer usage.

F. OPPORTUNISTIC FORECASTING

Not to be used disparingly, the implication is that the forecaster will not depend upon one source, but will take information any way it is available. This will be analyzed by the most convenient method. In other words, it is a collection of models. **Regression analysis** may be used to determine the influence of variables under study. The forecaster seeks to discover those variables, **which have the greatest impact on a behavior**. Hopefully, they will fall under the control of the clinician. Such a model is used to estimate the relationship between two random variables.

There is an art and science to forecasting. Art considerations may be the role of the manual forecaster. The rendering of the resultant factors in the

forecast will determine actually how good it is. With the arc, forecasting is so good that the operator must guard against overenthusiasm..

IV FINAL DEMONSTRATION OF FORECASTING – Contributions of Dr. Andrew Haas

Dr. Haas took up the cause of extraoral traction as a student. Since then he has made a contribution to teaching, on a wide scale, the possibility of maxillary reduction. In 1992 he submitted thirty long term treated patients (N=30) for compositing in order to study the results. The rotation of the mandible did not return completely **(Fig. 12-1 to 12-4).**

Perhaps the force was excessive At the permanent dentition ages we recommend 700 grams of force and no more than 12 to 14 hours of daily wear. This may account for the difference in the Facial Axis behavior shown in the composite of Dr. Haas with our sample of early cases shown in Lecture Nine.

V DELIBERATIONS

Even if the author were to concede that "orthopedics" is impossible, the amount of alveolar process available to ator in the growing child is extensive. The alveolar process includes the area from which teeth are formed and the support after eruption.

The amount of alveolar process also can be determined by the loss of bone after the teeth are lost as shown **(Fig. 12-5)**. The teeth fall under the influence of the muscles **(Fig. 12-6)**.

The muscular apparatus is a direct factor related to the position of the teeth and the form and size of the arch. The lower muscles are the Mentalis (M), the Quadratus Inferioris (QI), the Triangularis (T) and the Buccinator (B).

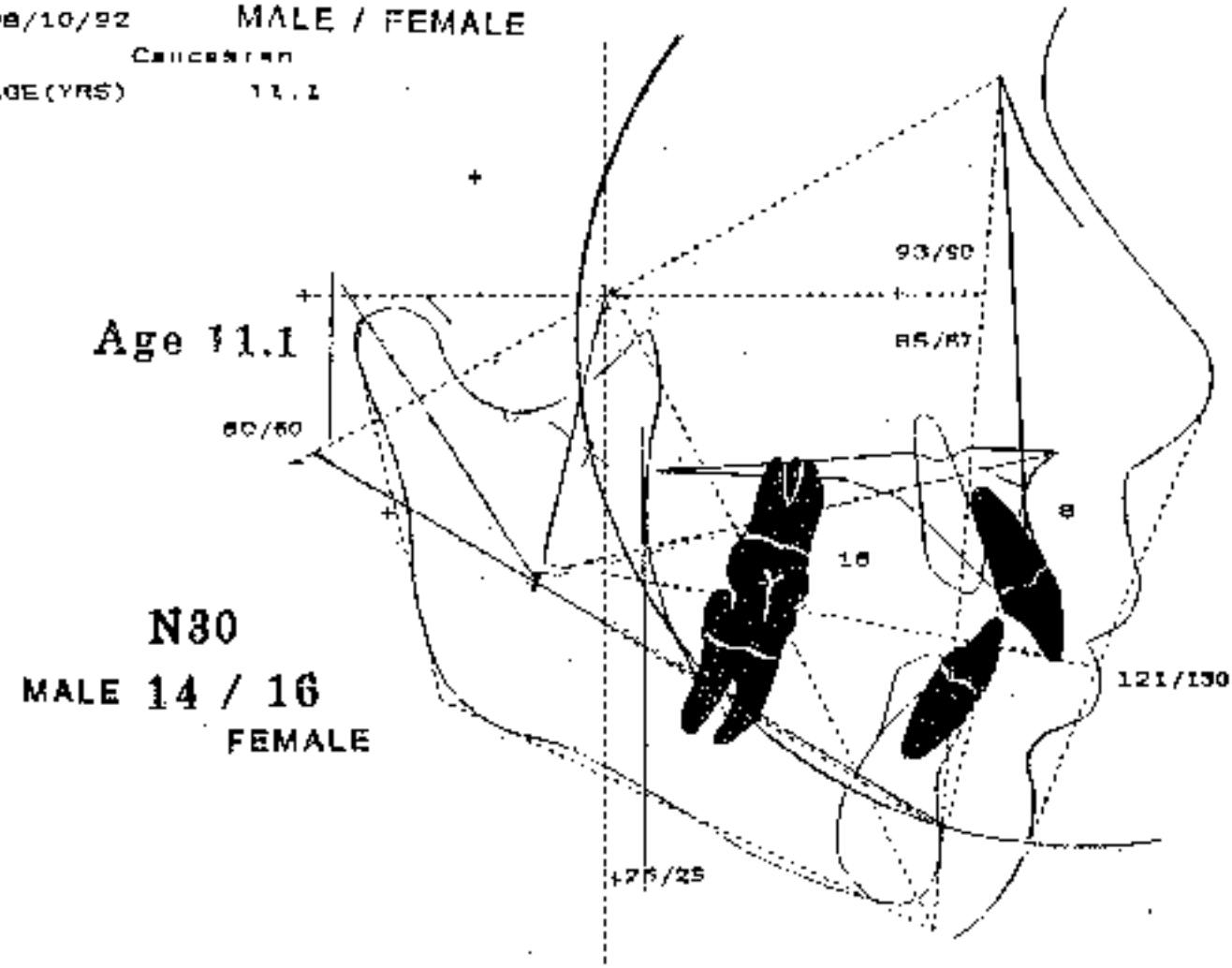
CLASS II **HAAS** **T1**

RICKETTS/HAAS

08/10/92 MALE / FEMALE

Caucasian

AGE(YRS) 11.1



N30

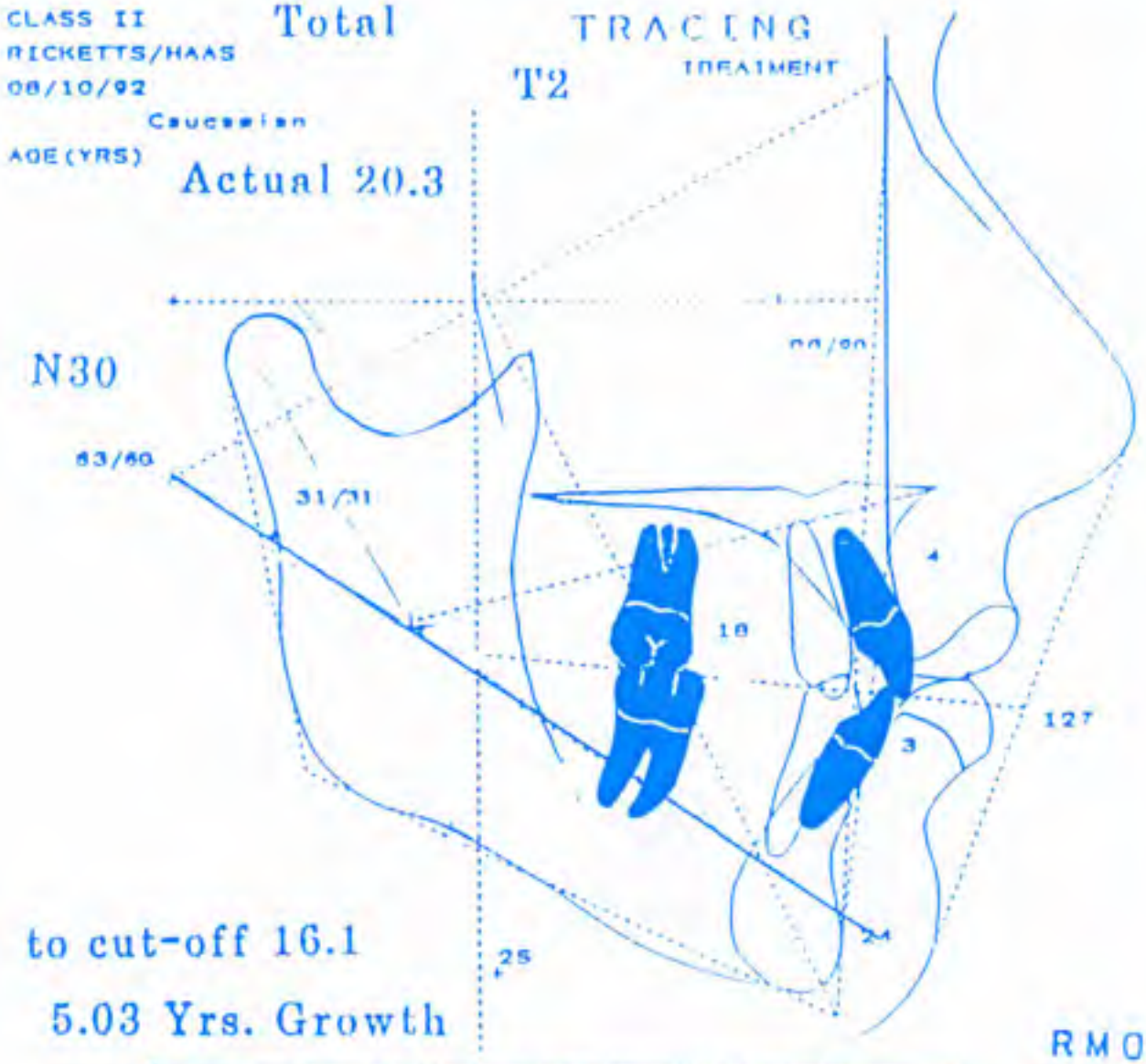
MALE 14 / 16

FEMALE

FACIAL PATTERN: MESOFACIAL						
# FACTORS	MEASURED VALUE		NORM		CLINICAL DEVIATION	
Interincisal Angle	121.3	dg	130.0	dg	-1.4	*
Convexity	7.9	mm	2.0	mm	2.5	**
Lower Facial Height	44.9	dg	45.0	dg	0.0	
A6 Molar Position to PTV	16.2	mm	14.1	mm	0.7	
B1 to A-Po Plane	0.7	mm	1.0	mm	-0.1	
B1 Inclination to A-Po	19.9	dg	22.0	dg	-0.8	
Facial Depth	85.5	dg	87.3	dg	-0.5	
Facial Axis	87.4	dg	90.0	dg	-0.7	
Maxillary Depth	92.1	dg	90.0	dg	1.0	*
Mandibular Plane to FH	25.2	dg	25.4	dg	0.0	
Mandibular Arc	28.1	dg	27.2	dg	0.2	
Total Facial Height	80.5	dg	80.0	dg	0.2	

Thirty Class II patients kindly submitted by Dr. Andrew Haas in 1992 for compositing (T1). Note severe convexity in the 14 boys and 16 girls started at age 11.1 years years. The arc was constructed and a forecast was made for the sexual cut-off ages. The maxilla was forward.

FIG. 12-1



FACIAL PATTERN: MESOFACIAL

# FACTORS	MEASURED VALUE		NORM		CLINICAL DEVIATION	
Interincisal Angle	127.4	dg	130.0	dg	-0.4	
Convexity	3.8	mm	0.3	mm	1.7	*
Lower Facial Height	47.8	dg	45.0	dg	0.7	
A8 Molar Position to PTV	18.1	mm	21.0	mm	-1.0	*
B1 to A-Po Plane	2.7	mm	1.0	mm	0.7	
B1 Inclination to A-Po	24.3	dg	22.0	dg	0.6	
Facial Depth	88.5	dg	89.5	dg	-1.0	*
Facial Axis	85.7	dg	90.0	dg	-1.2	*
Maxillary Depth	89.5	dg	90.0	dg	-0.1	
Mandibular Plane to FH	25.1	dg	23.3	dg	0.4	
Mandibular Arc	31.1	dg	30.7	dg	0.1	
Total Facial Height	82.7	dg	80.0	dg	0.9	

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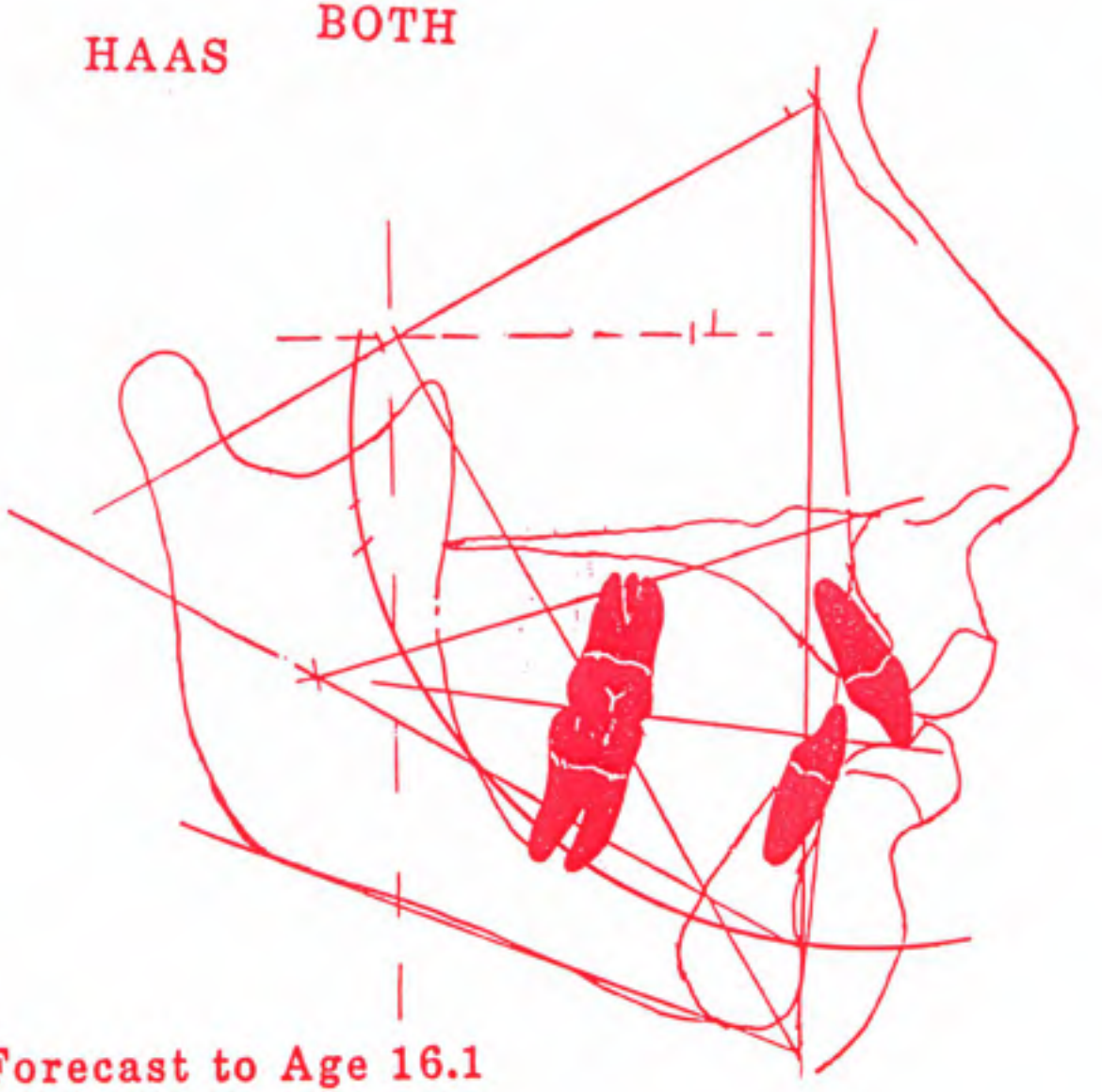
T2 the same group composited after retention at age 20.3. Note the good result but a reduction in the Facial Axis of two degrees.

FIG. 12-2

N30
BOTH

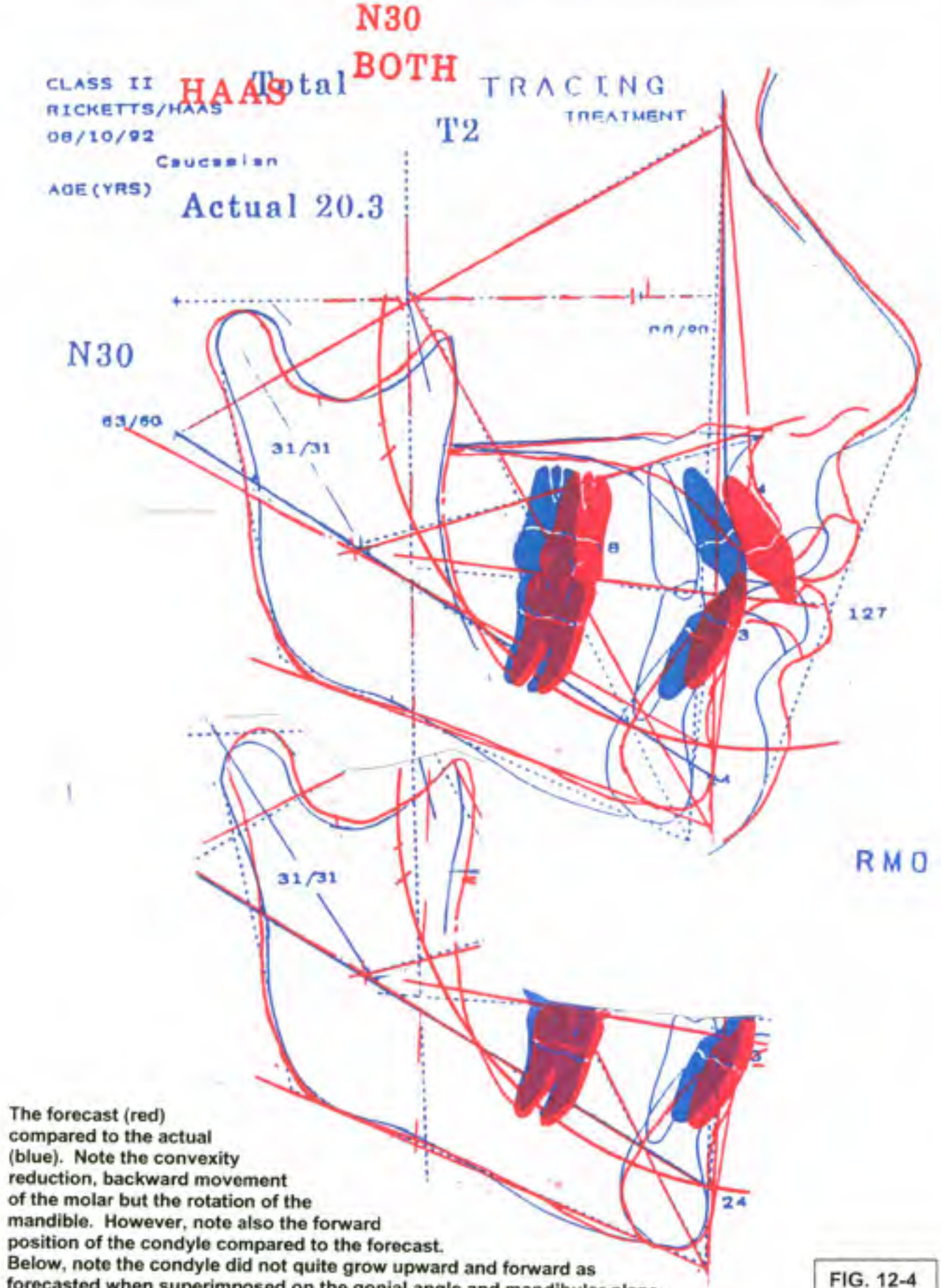
HAAS



Forecast to Age 16.1

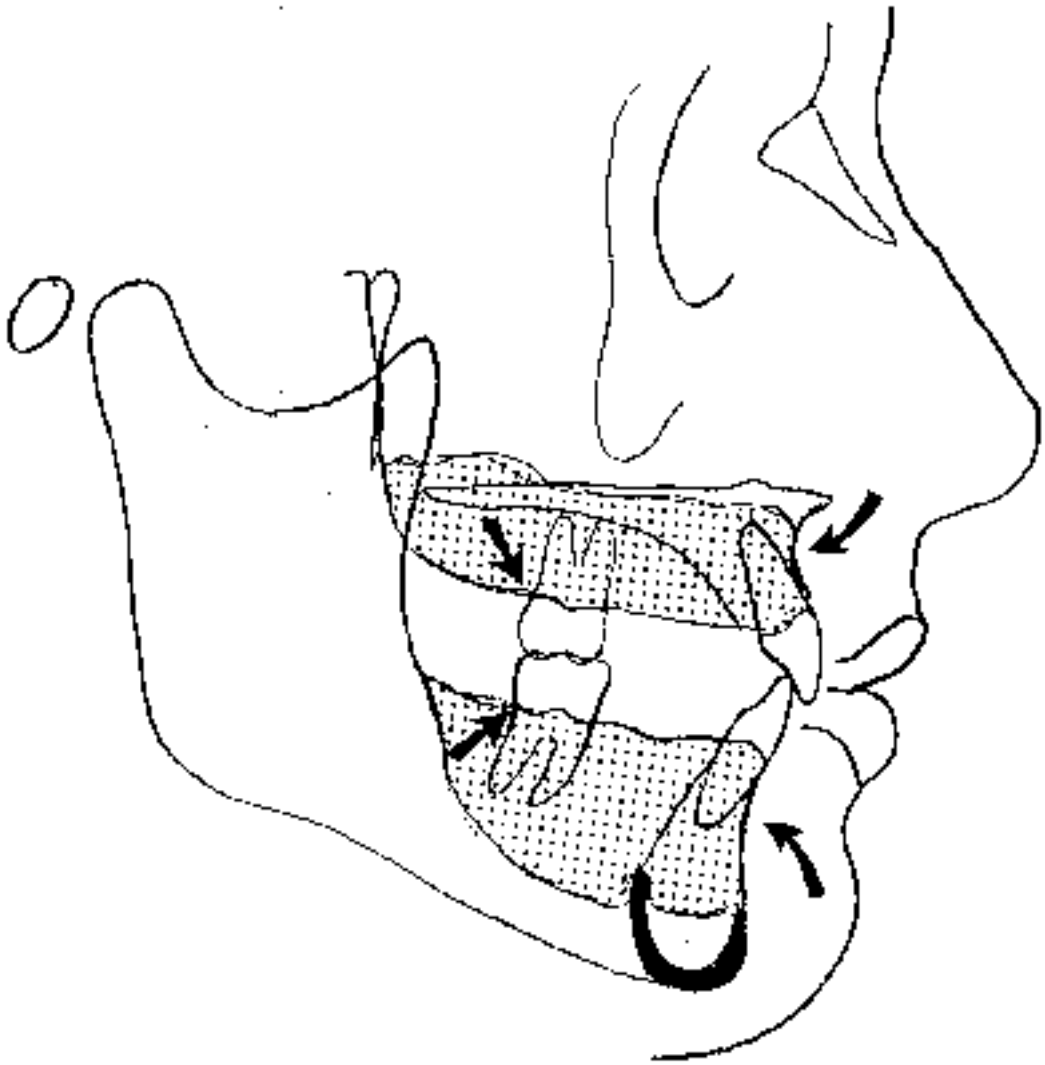
The manual forecast of the total group without treatment.

FIG. 12-3



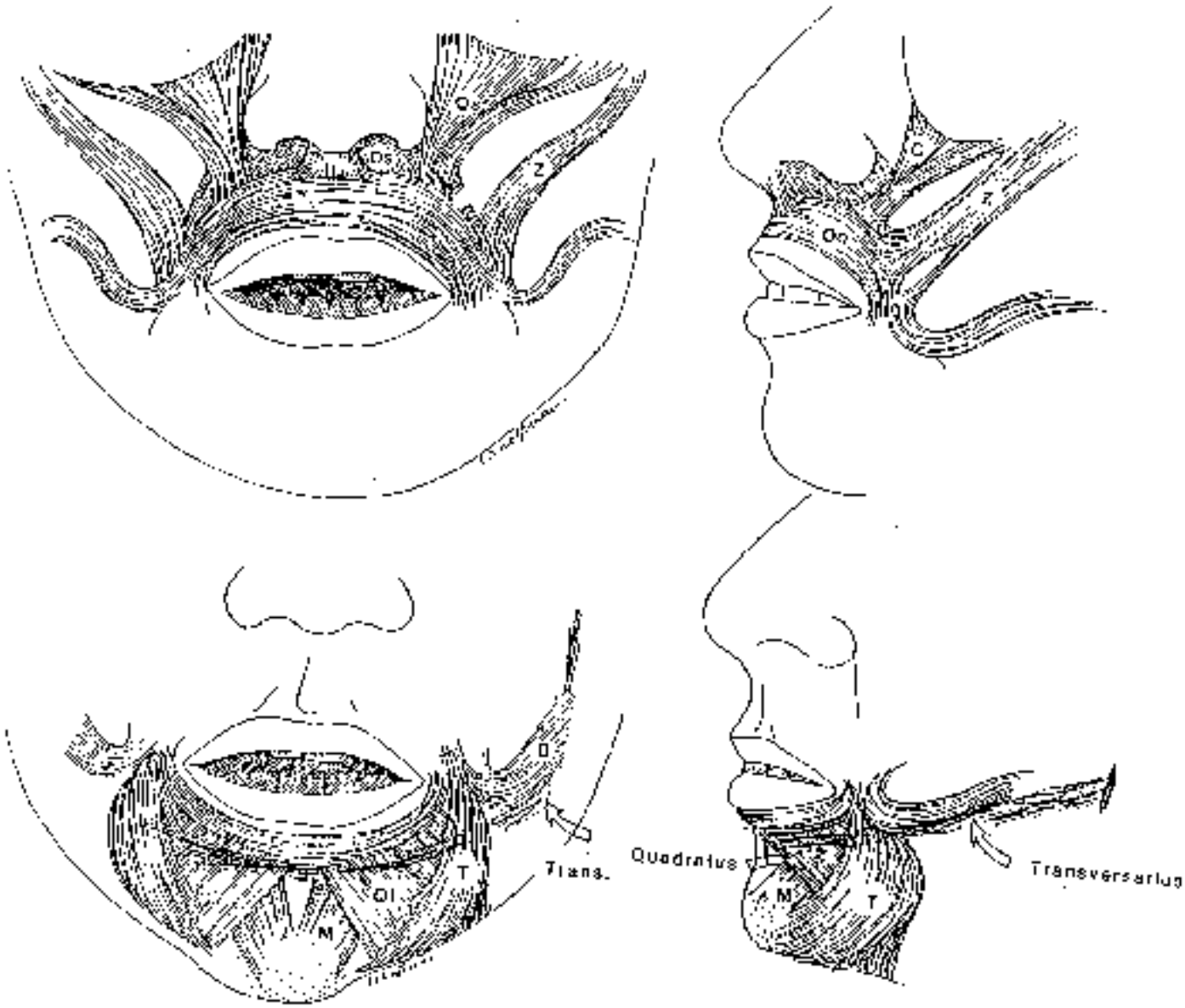
The forecast (red) compared to the actual (blue). Note the convexity reduction, backward movement of the molar but the rotation of the mandible. However, note also the forward position of the condyle compared to the forecast. Below, note the condyle did not quite grow upward and forward as forecasted when superimposed on the gonial angle and mandibular plane.

FIG. 12-4



The amount of loss of bone in a dentulous patient compared to a long term edentulous patient with the same pattern. Note the loss is far beyond the apices of the roots. Therefore the "apical base" is not the limits of the alveolar process. Note the amount of bone that can be influenced in the alveolus in the young patient. The arrows show the "containment" effects of muscles.

FIG. 12-5



The upper alveolus is "contained" by the orbicularis oris, superior muscles of the lip but also muscles of the nose. The lower lip is complex particularly as influenced by a strap of muscle extended from one pterygo-mandibular raphe to the other. This muscle together with the quadratus inferioris and the mental raphe is released by surgery in extremely tight conditions.

FIG. 12-6

However, a muscle has been identified in many patients to run from the pterygo-mandibular raphe forward as a strap around the arch. We have called it the "bandus transversarius". It is located below the orbicularis oris and in a strand below the buccinator. The restraints on the maxillary arch include the muscles of the nose.

In answer to the critics who take stands against early treatment: truly there are some legitimate concerns. Diagnosis and prognosis cannot be shoddy. Treatment regimes are not as simple as some make them appear. But when therapy is delivered in the manner described success is routinely expected.

Let us hope the pendulum stays home on the positive side with the demonstration of these records and data more than fifty years in the making.

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