American Institute for Bioprogressive Education

ORTHODONTIC TREATMENT IN THE GROWING PATIENT

VOLUME 3 - MECHANICS

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VOLUME III

MECHANICS FOR DECIDUOUS AND MIXED DENTITIONS – ORTHODONTIC AND ORTHOPEDIC TREATMENT

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LECTURE TEN – MECHANICS FOR CLASSIC JUVENILE TYPES OF MALOCCLUSION

I. INTRODUCTION

This lecture will demonstrate different types of malocclusions and different treatment plans for Juvenile patients. For our purposes the juvenile is the youth with the deciduous and mixed dentition present as distinguished from the adolescent with the permanent teeth erupted. We shall focus on **possibility** before any or all the permanent teeth have erupted.

In the last lecture the value of the computer composite was emphasized. The orthopedic or skeletal changes were proven beyond argument.

When a composite of a group of patients is studied, it is real – not a speculation. Growth needs to be separate from Treatment changes. In order to accomplish that, a **four position change analysis** quickly describes the behavior of each individual jaw and the Individual teeth within the jaws. With normal behavior and its variation as a base, the effects of appliances can be evaluated rather than speculated.

A. Material for this Lecture

Some types of conditions were exhibited in previous lectures. Now attention is drawn to specific treatment mechanics employed for the following 10 general conditions:

1. Both the Deciduous and the Mixed dentitions;
2. Class I, II and III malocclusions;
3. Open bite and closed bite;

4. Cross-bites: Lingual, buccal and anterior;
5. Upper canine impaction and lower canine impaction;
6. Third molar germectomy;
7. Extraoral anchorage and Intraoral traction;
8. Buccal expansion and contraction and serial extraction;
9. Elongation and reduction of arches;
10. Intrusion, Extrusion and Torque.

When these children were treated in the office of Dr. R. Ricketts and Dr. R. Bench, the VTO was applied but facial growth of the mandible and long range forecasting was not discovered until 1971. However, the long range VTG has been constructed and is demonstrated for teaching purposes.

The original records are presented. Models are traced and study is made from measured delicate tracings of cephalometric films. An abstracted descriptive analysis is shown together with the four positional change analysis. Models are in storage at Loma Linda University. All patients were finished to American Board Standards.

For the student's information a VTO is the usual two year objective. The VTG is the goal at the termination of growth expectancy or to represent the age of the last headfilm. The LRF is simply a long range forecast without treatment to maturity. It is understood that slow insidious age changes continue throughout life.

II. RESULTS OF TREATMENT – STARTED IN THE DECIDUOUS DENTITION - *Group One*

A. Case #1 R.M.♀ - Class II Open Bite

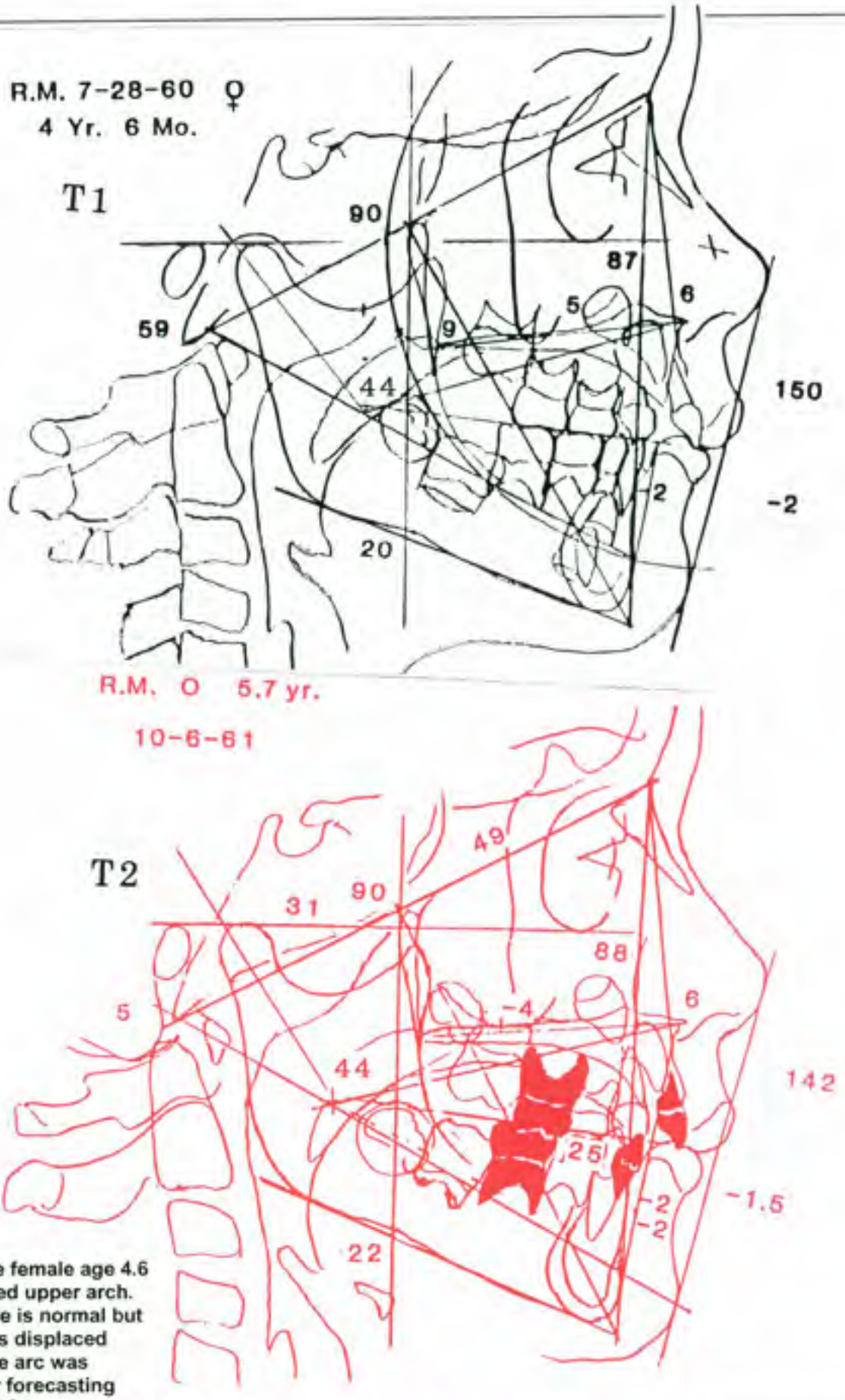
This Class II patient was first seen at age 4.6. The original condition was open bite and narrowness in the transverse dimension at the upper second deciduous molars. Treatment was postponed until started at age 5.7. One year's normal growth without treatment is shown with skeletal change analysis (Position 1 and 2) (**Fig. 10-1 series**).

Treatment

At age 5, she received bands on the upper deciduous second molars, a face bow activated with a cervical strap using 300 grams. No other treatment was performed through the mixed dentition development as shown. At the permanent dentition stage of development at age 11, a labial bar was placed in order to rotate the upper first permanent molars while a utility arch was employed to detail the lower anterior segment.

The VTG is shown as constructed. Progressive tracings are displayed from the headplate at age 4.6 years.

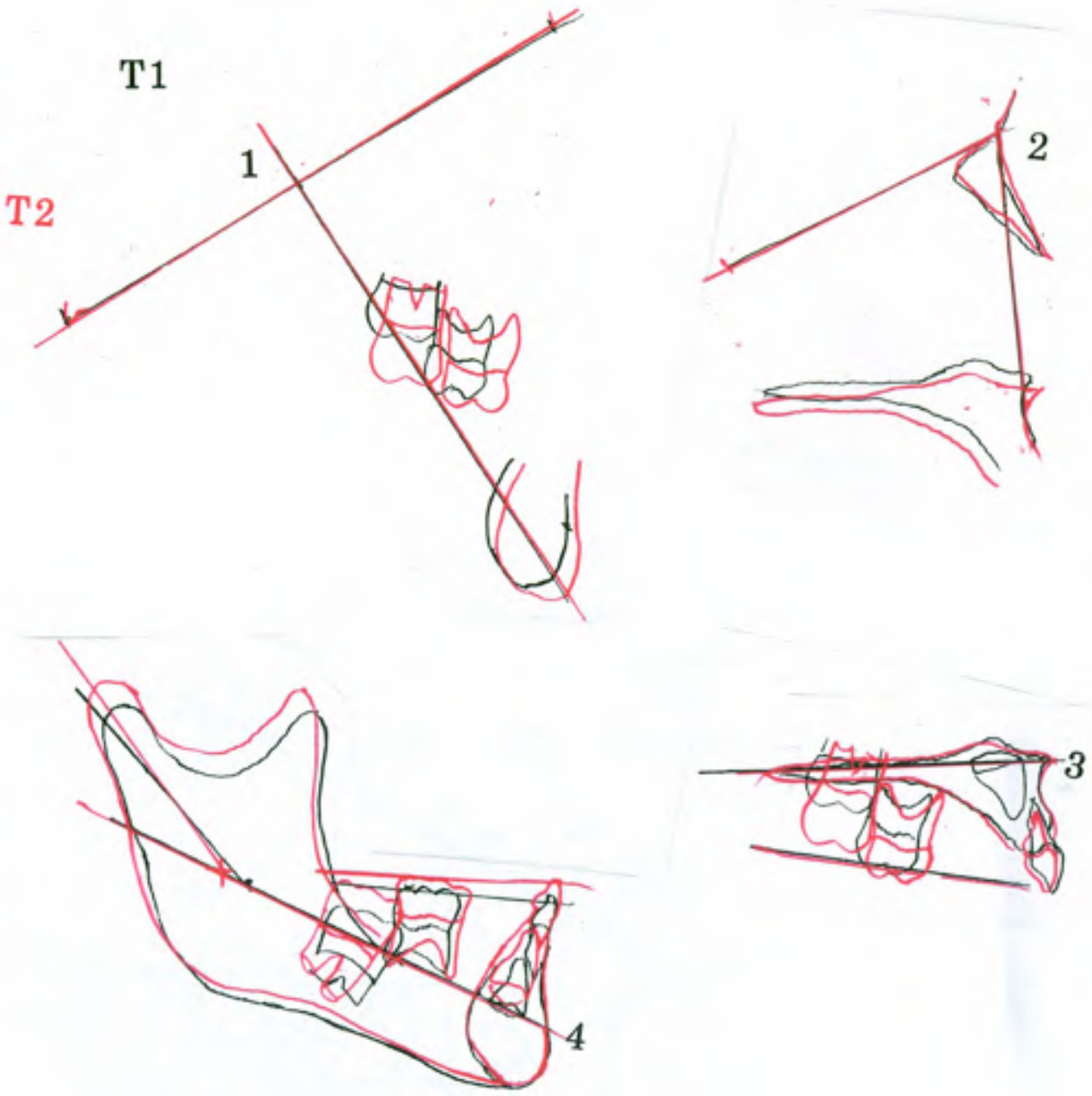
This patient demonstrates the simplicity with which open bite Class II children can be managed orthopedically with only two upper second deciduous molars as anchorage. It further demonstrates the accuracy for projecting growth of forecasting to maturity from as early as age 4 years.



T1 An open bite female age 4.6 with narrowed upper arch. The Mandible is normal but the maxilla is displaced forward. The arc was prepared for forecasting growth to 14.8 years.

T2 The same patient 14 months later showing typical growth changes and thumb habit overcome. Treatment with face bow started at 5.7 years.

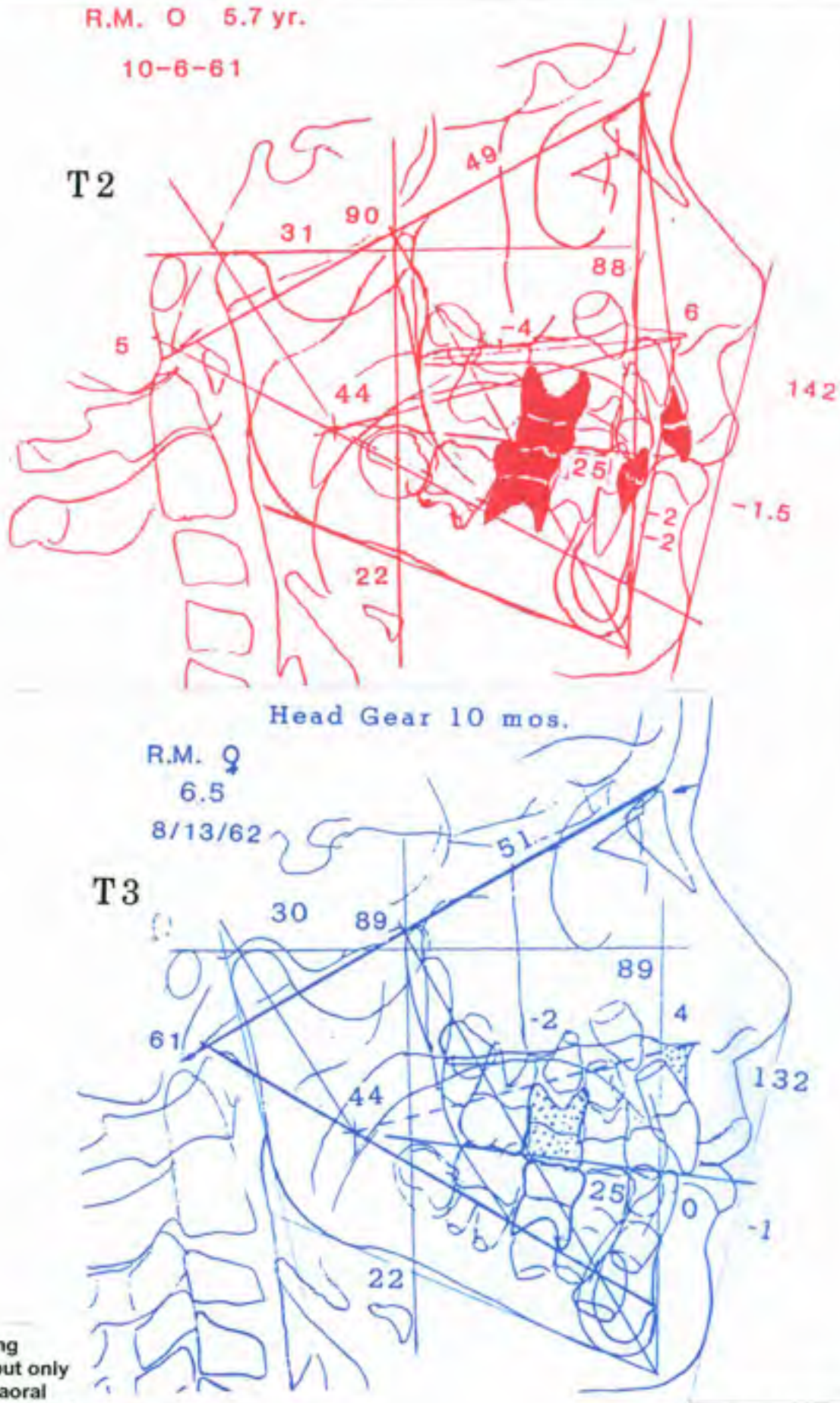
FIG. 10-1-i



The Four Position growth analysis.

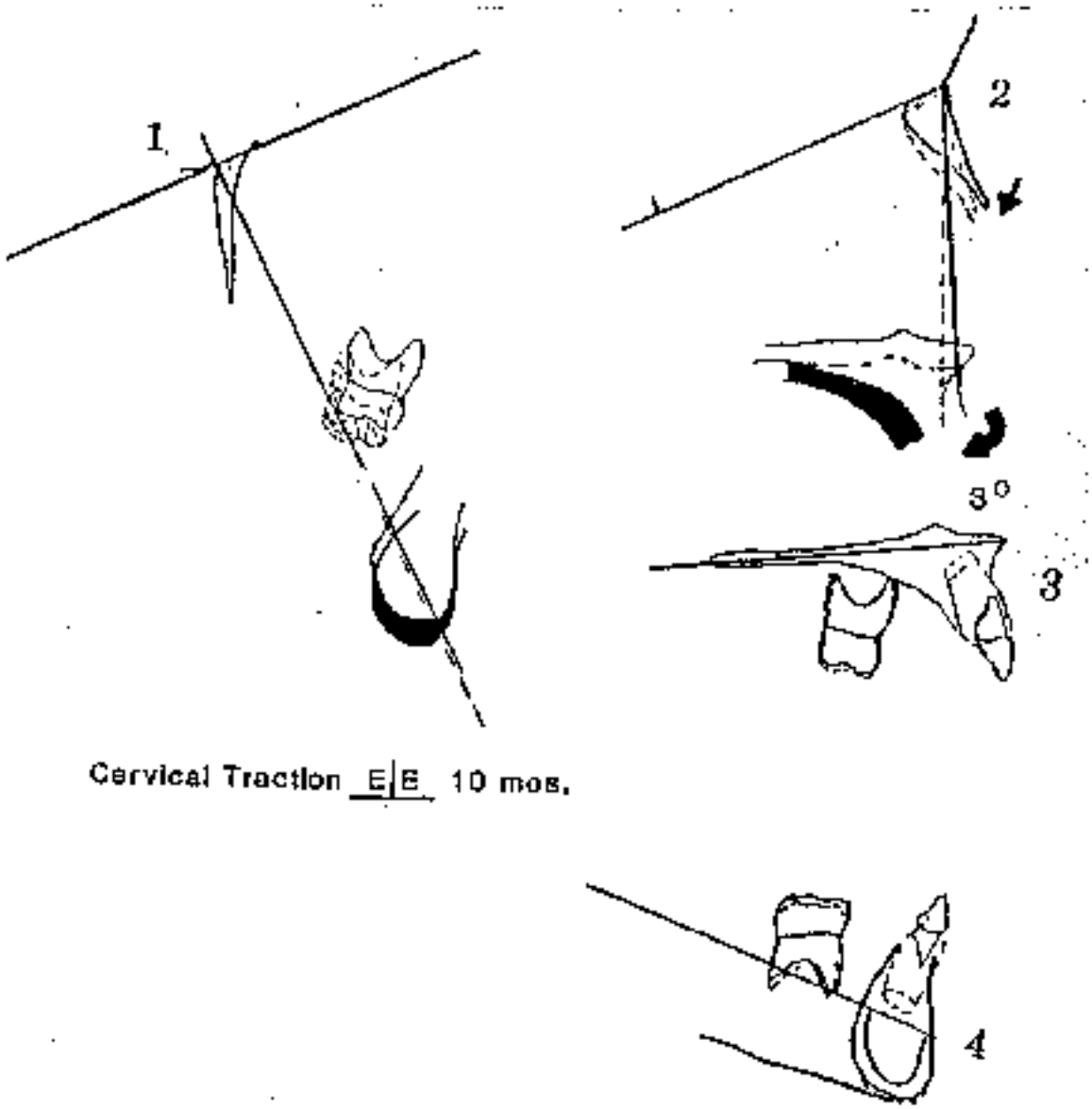
1. Normal growth but Class II continued.
2. No change in BaNA.
3. Continued forward draft of upper molar.
4. Typical arch development and forward bend.

FIG. 10-1-ii



T2 The time of starting
T3 After 12 months but only 10 months of extraoral traction. Note the normal arch relationship established see Fig. 10-1-iv for analysis.

FIG. 10-1-iii

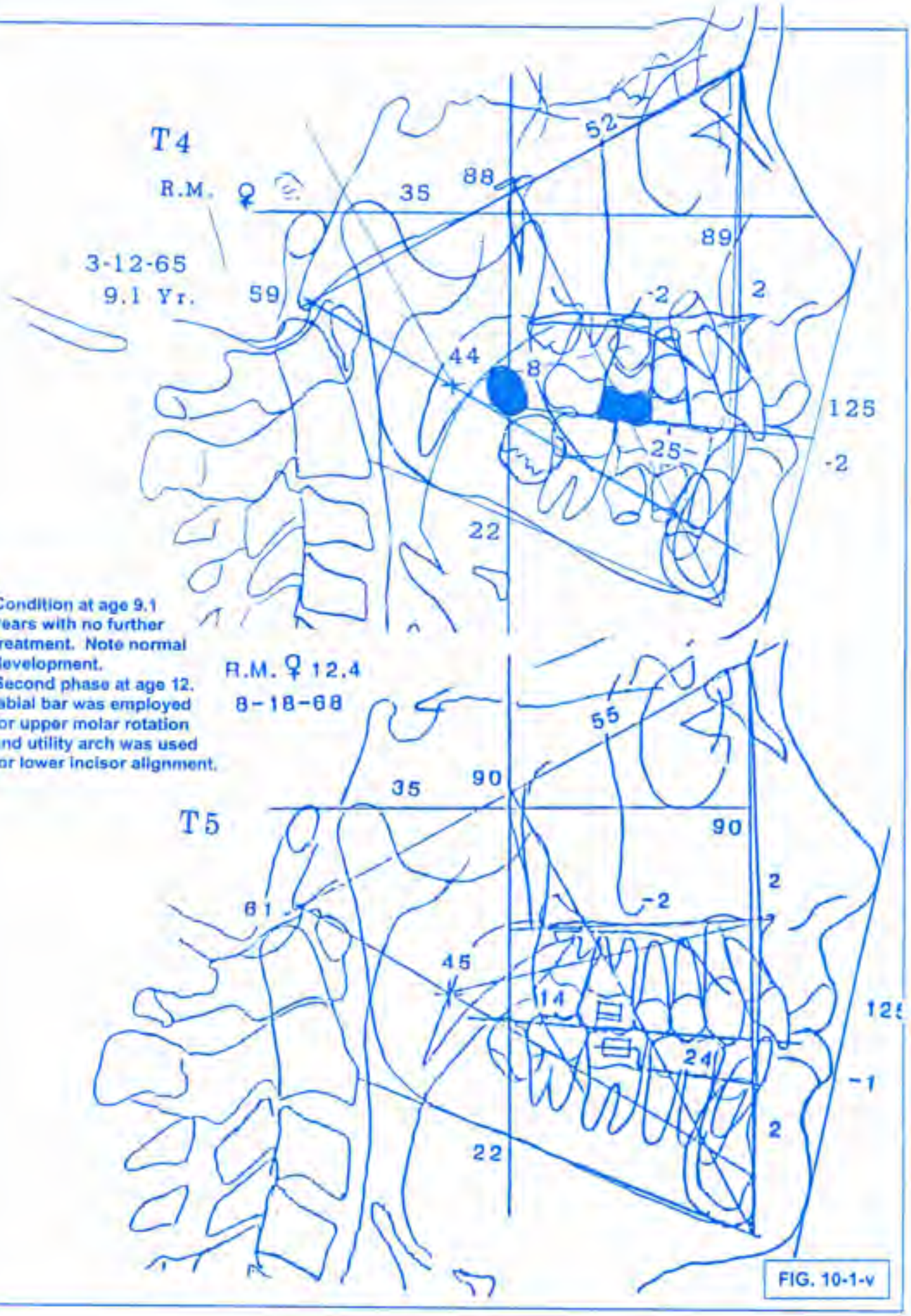


Cervical Traction E|E 10 mos.

T2 to T3 Analysis.

1. An opening of less than 1 degree and backward correcting molar.
2. Three degrees of maxillary basal reduction.
3. Little change in upper arch.
4. Slight intrusion of lower molar.

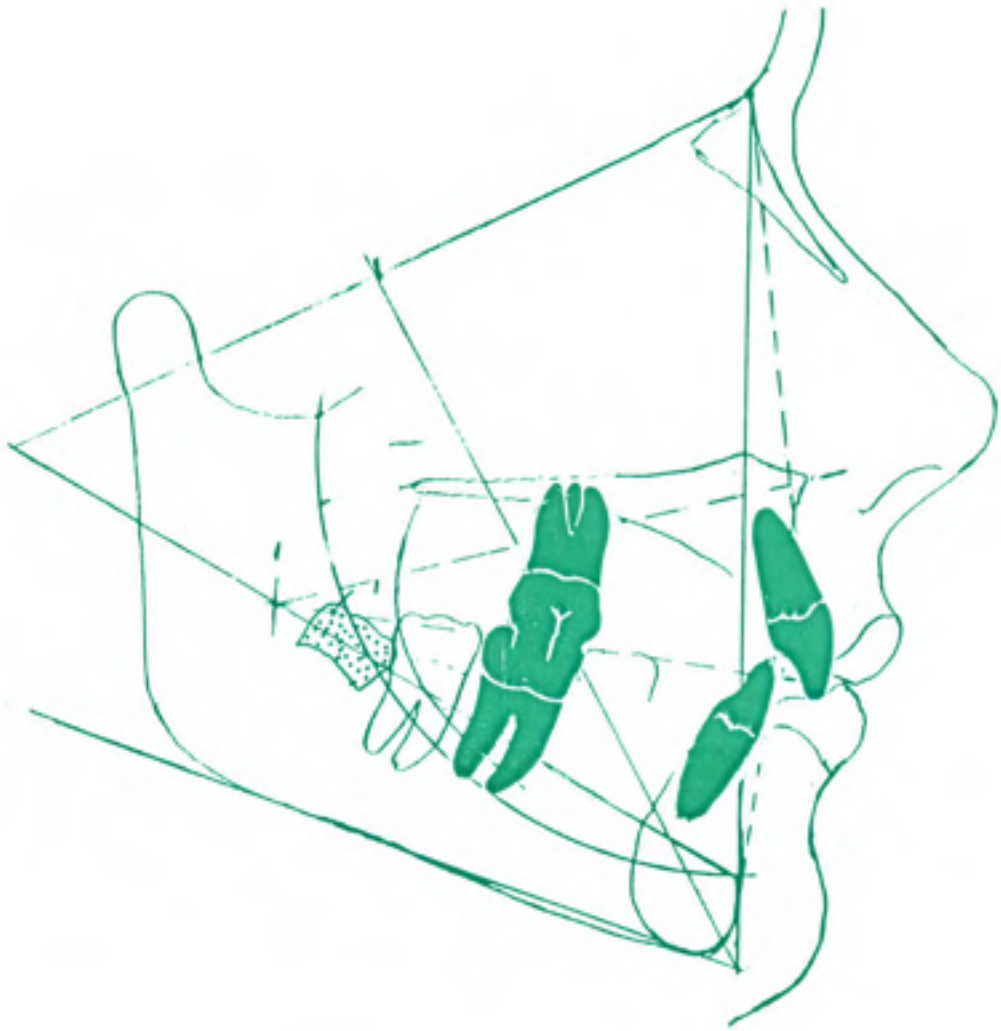
FIG. 10-1-iv



T4 Condition at age 9.1 years with no further treatment. Note normal development.

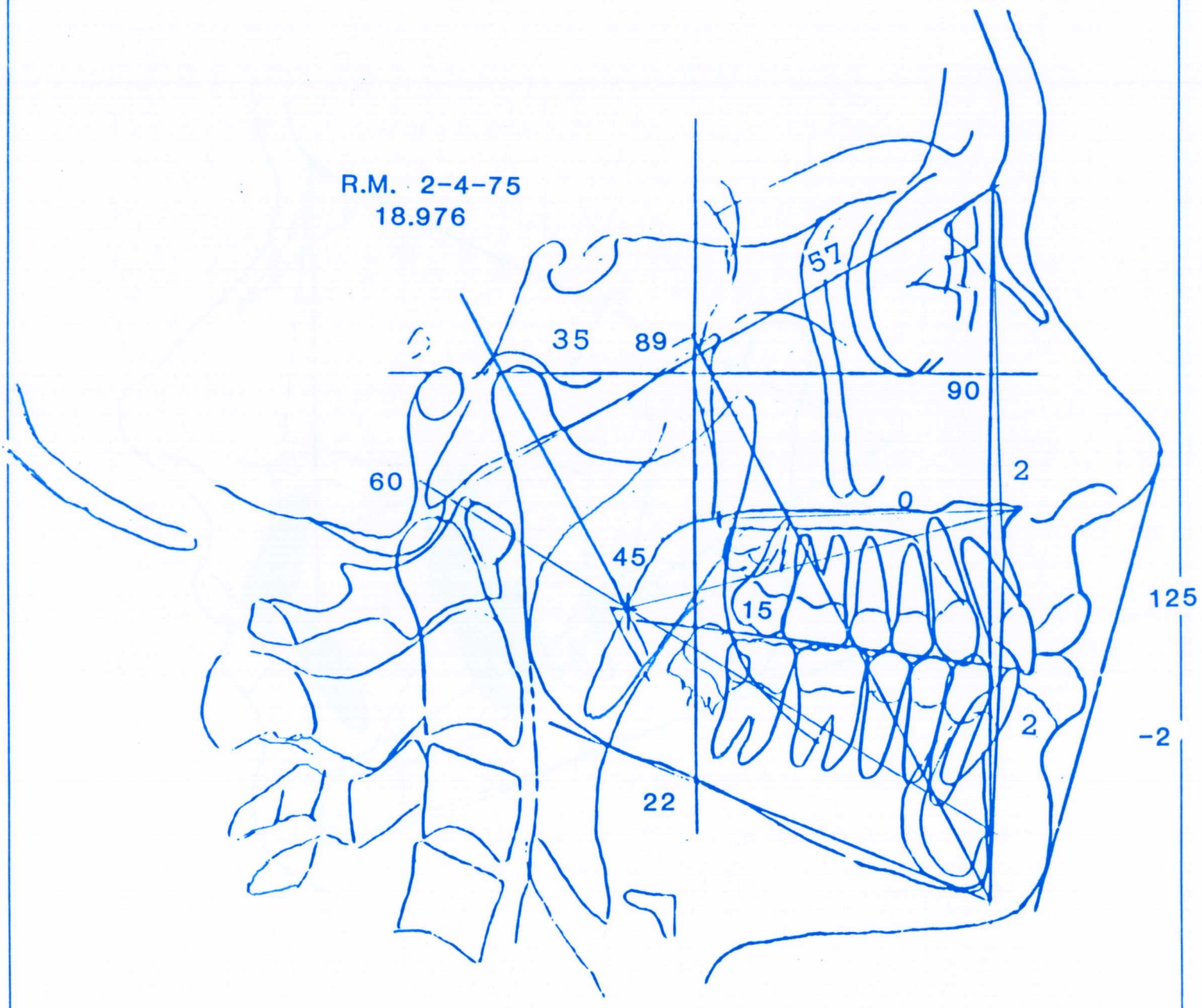
T5 Second phase at age 12. labial bar was employed for upper molar rotation and utility arch was used for lower incisor alignment.

FIG. 10-1-v



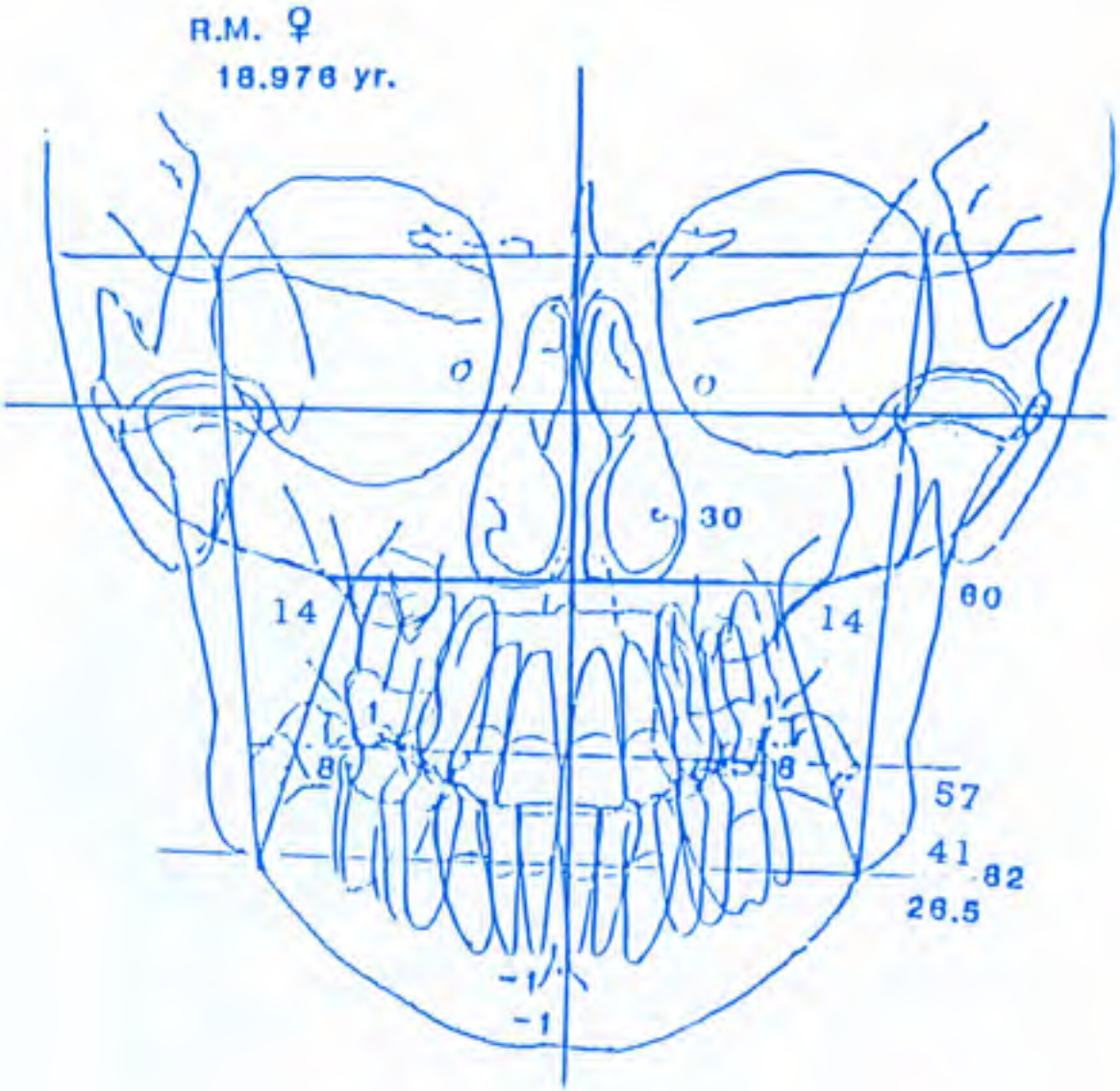
Long range Forecast (LRF) to 14.8 without treatment. Note the Class II still present and limited space for third molar. The patient should have been enucleated but the procedure was unknown to the author in 1965. (It was developed in 1972.)

FIG. 10-1-vi



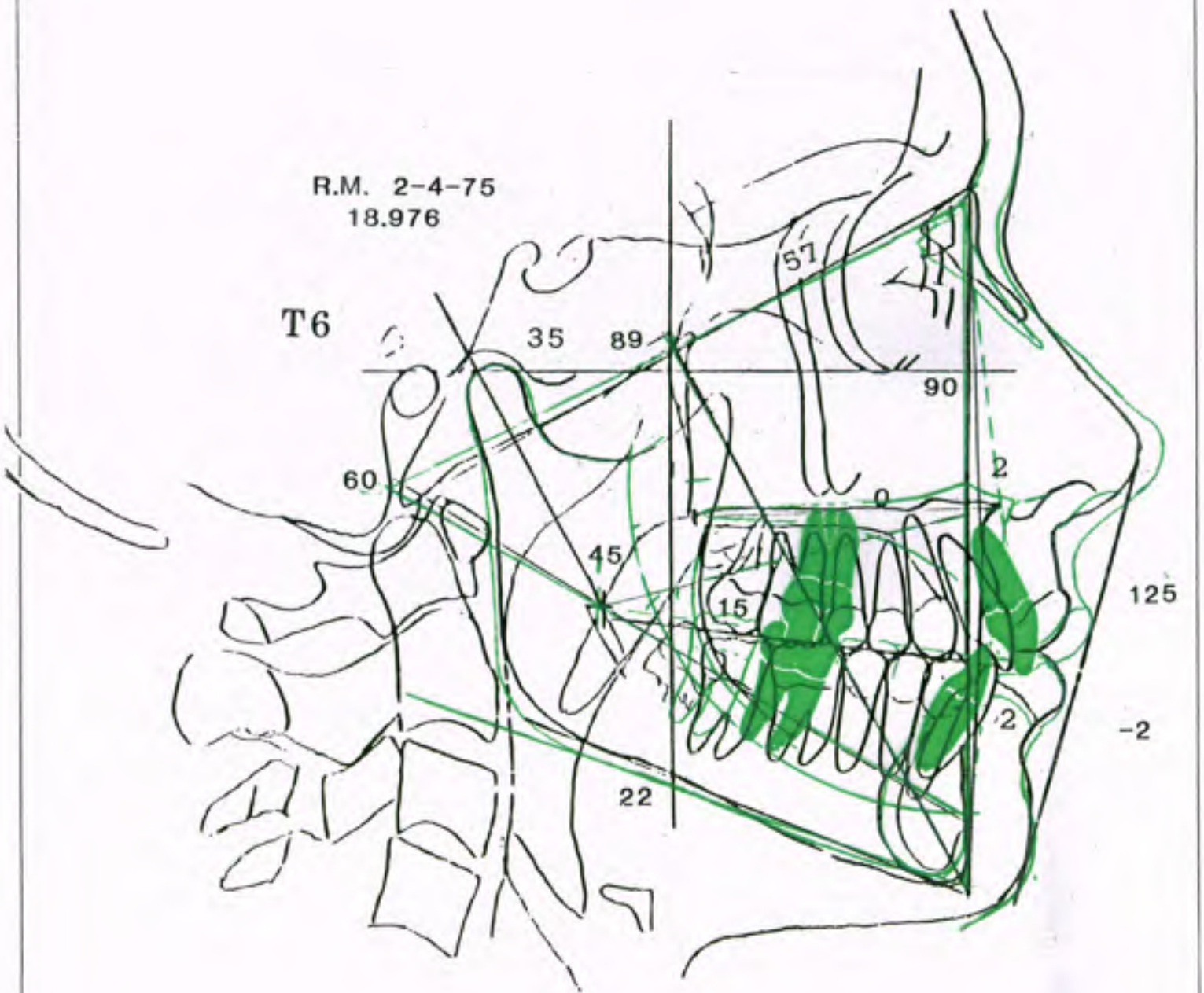
The lateral tracing of patient R.M. female at age 18.976. Note almost ideal relationship, 89° Facial Axis, 2 mm. convexity and 2 mm. lower incisor. Note impacted lower third molars as predicted.

FIG. 10-1-vii



The frontal on Patient R.M. Note the symmetrical nasal cavity and ideal width with normal occlusal dimensions.

FIG. 10-1-viii



The Forecast superimposed over the Actual.
Note the exactness of the mandibular length and the profile changes compared to an untreated projection.

FIG. 10-1-ix

Case #2 G.M.d - Class II Closed Bite Brodie Syndrome

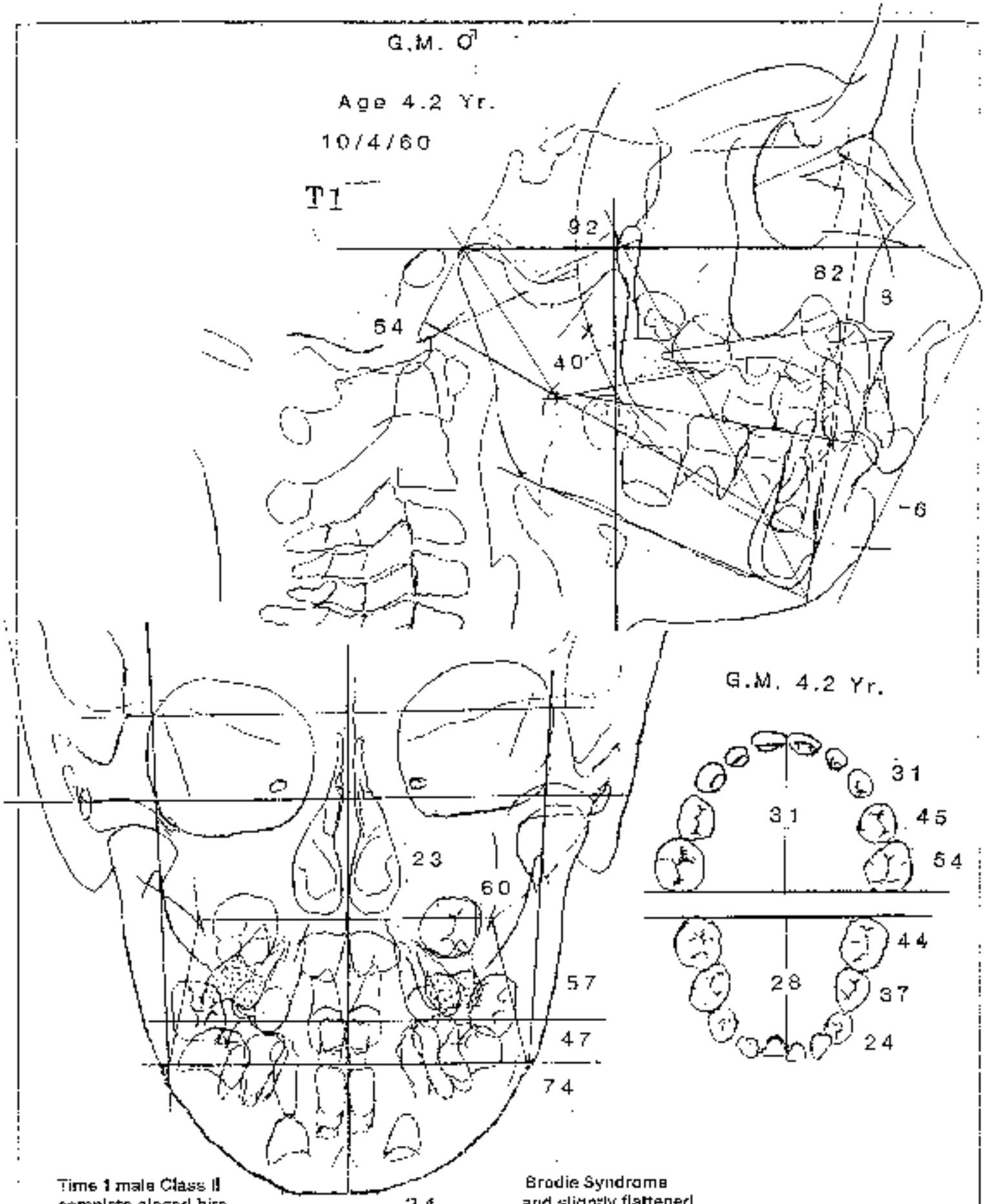
This patient was also first seen at age 4.2 yrs. (**Fig. 10-2 series**). He was Class II and the opposite of Case # 1. He had a complete buccal cross bite and closed bite (as opposed to open bite and lingual cross-bite). Yet the palatal plane was tipped upward – actually more than seen Case #1.. The child had great difficulty in chewing. He positioned the mandible forward to the summit of the eminence in order to eat and to speak. The rest position in the photograph is shown. The treatment goal (VTG) was constructed at age 18, the date of the last film.

Treatment

The first phase of correction consisted of placing a "contraction" type cervical traction device on the upper second deciduous molars. Later, a fixed looped lingual expansion arch in .040 gold was placed on the lower second deciduous molars. The first objectives - treating the Class II and the cross bite was met by age 6.4.

A second phase in the mixed dentition was required, to manage the incisor overbite. This was accomplished with a lower utility arch started at age 8 yrs. A head gear was reapplied to secure and insure a good Class I molar relation. The patient was retained for one year with part time head gear wear. The third phase consisted of standard multi band procedure with coordination of arches and overtreatment for finishing.

The result was highly stable. Major maxilla orthopedics was demonstrated probably as great as ever witnessed. In fact more than necessary perhaps. This patient demonstrated that posterior movement of the maxilla reduces the amount of forward movement required in the lower arch for a Class II correction. The fact that three phases were conducted may bother some clinicians. But how can a child be neglected to suffer such a handicapping malocclusion.



Time 1 male Class II Brodie Syndrome
complete closed bite and slightly flattened
Condyls already at age 4.2 years. The mandible
is brachyfacial but the convexity is high (8 mm.). Frontal shows a 5 mm.
excessive width of maxilla. Note differences in arch width.

FIG. 10-2-i

RMO Diagnostic Services
RMO, Inc

M . . ., GREG L RMO Case Number: 0010 3635 1
Dr. Ricketts RMO Run Date: 09/09/98

C C D - O R T H O D O N T I C C O N D I T I O N S

LATERAL BEFORE TREATMENT

# - Appears on tracing	FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
	DENTAL RELATIONS				
D1	Molar Relation	7.9 mm	-3.0 mm	3.6	***
D3	Canine Relation	7.4 mm	-2.0 mm	3.1	***
D5	Incisor Overjet	11.1 mm	2.5 mm	3.4	***
D7	Incisor Overbite	6.1 mm	2.5 mm	1.8	*
D9	Hand Incisor Extrusion	6.4 mm	1.3 mm	2.6	**
#11	Interincisal Angle	140.0 dg	141.0 dg	-0.2	
	DENTAL TO SKELETON				
#18	A6 Molar Position to PTV	7.5 mm	7.3 mm	0.1	
#20	B1 to A-Po Plane	-5.1 mm	1.0 mm	-2.7	**
22	A1 to A-Po Plane	6.9 mm	3.5 mm	1.5	*
#24	B1 Inclination to A-Po	4.8 dg	22.0 dg	-4.3	***
26	A1 Inclination to A-Po	35.3 dg	26.0 dg	1.8	*
27	Occlusal Plane to Xi	1.8 mm	3.2 mm	-0.4	
28	Inclination of Occl Plane	22.0 dg	20.3 dg	0.4	
54	B1 Inclination to FH	66.2 dg	65.0 dg	0.2	
	ESTHETICS - Lips are open on X-Ray				
29	Lower Lip to Esthetic Plane	-3.6 mm	-0.1 mm	-1.7	*
30	Upper Lip Length	29.0 mm	21.9 mm	3.5	***
31	Lip Embrasure to Occl Plane	0.5 mm	3.0 mm	1.7	*
58	NasoLabial Angle	135.8 dg	115.0 dg	4.2	***
	NASOPHARYNGEAL AIRWAY				
62	N-S-Ba	127.9 dg	129.5 dg	-0.3	
63	Ba-S-PNS	64.1 dg	53.9 dg	0.4	
85	Airway Percent	53.7 %	50.8 %	0.2	
86	Linder-Aronson AD1	24.2 mm	20.2 mm	0.8	
87	Linder-Aronson AD2	18.3 mm	15.4 mm	0.7	
88	Distance PTV to Adenoid	9.2 mm	7.1 mm	0.5	

The printout for dental, skeletal and esthetic values shows severe dysplasia (six triple asterisks).

FIG. 10-2-ii

(800)455-8864 Post Office Box 9812
(216)222-7663 Calabasas, CA 91302-0812

Age: 4.3 Reference: C C D 1
Sex: Male 1

C C D - S K E L E T A L C O N D I T I O N S

LATERAL BEFORE TREATMENT

FACTOR # - Appears on tracing	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM.
SKELETAL RELATIONS			
#13 Convexity	9.3 mm	2.1 mm	3.6 ***
#15 Lower Facial Height	48.2 dg	45.0 dg	0.8
84 Present Patient Height	NOT AVAILABLE		
91 Posterior face height	65.9 mm		
92 Anterior face height	95.6 mm		
93 Posterior/Anterior ratio	68.9 %		
94 Saddle Angle	121.0 dg	123.0 dg	-0.7
96 Condylion-A point	86.0 mm	80.5 mm	2.3 **
97 Condylion-Gnathion	93.7 mm	96.6 mm	-0.7
95 Max-Mand Differential	7.7 mm	17.5 mm	-4.4 ***
98 Menton-ANS	56.7 mm	59.9 mm	-1.2 *
JAW TO CRANIUM			
#32 Facial Depth	82.4 dg	85.1 dg	-0.9
#34 Facial Axis	92.6 dg	90.0 dg	0.7
#36 Maxillary Depth	94.7 dg	90.0 dg	1.6 *
37 Maxillary Height	43.9 dg	51.3 dg	-2.4 **
38 Palatal Plane to FH	9.4 dg	1.0 dg	2.4 **
#39 Mandibular Plane to FH	21.3 dg	27.4 dg	-1.4 *
77 Ba-N-A	68.3 dg	63.0 dg	1.8 *
76 S-N-A	89.2 dg	82.0 dg	2.3 **
78 S-N-B	76.3 dg	80.0 dg	-1.0 *
69 A-N-B Difference	12.9 dg	2.0 dg	4.0 ***
75 Total Facial Height	55.7 dg	60.0 dg	-1.4 *
INTERNAL STRUCTURE			
40 Cranial Deflection	25.0 dg	27.0 dg	-0.7
42 Cranial Length Anterior	55.9 mm	51.8 mm	1.6 *
44 Ramus Height (Cf-Go)	52.0 mm	48.1 mm	1.2 *
46 Ramus Xi Position	70.7 dg	76.0 dg	-1.8 *
48 Porion Location (Por to PTV)	-38.5 mm	-39.9 mm	0.5
#50 Mandibular Arc	23.9 dg	23.8 dg	0.0
51 Corpus Length	60.0 mm	57.5 mm	1.0 *

Note the stars in the skeletal relations (some are favorable to Class II correction).

FIG. 10-2-iii

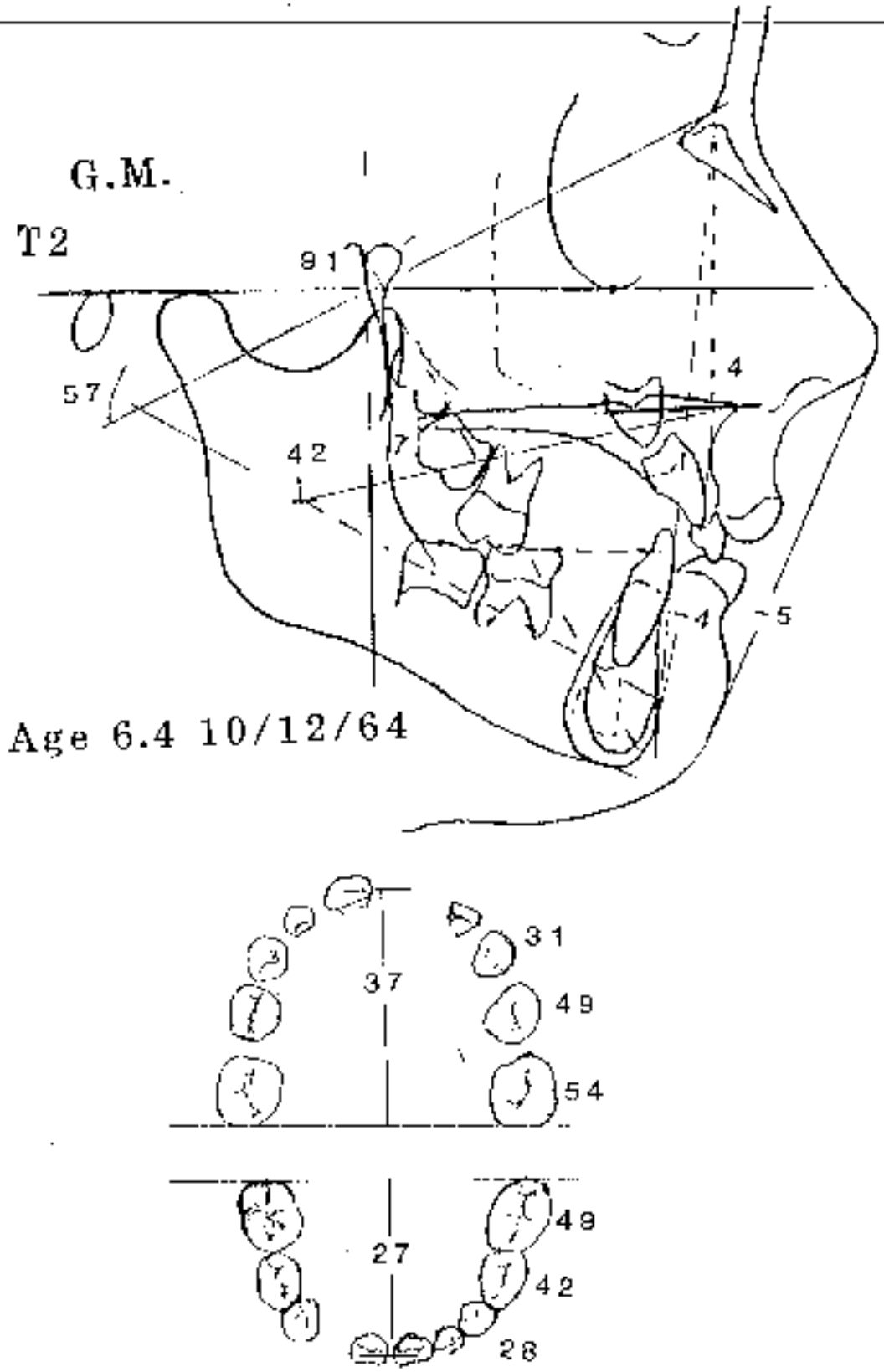
Forecast Long range

G.M. ♂

Facial photos were taken at physiologic rest position. The LRF untreated to 18.5 years.

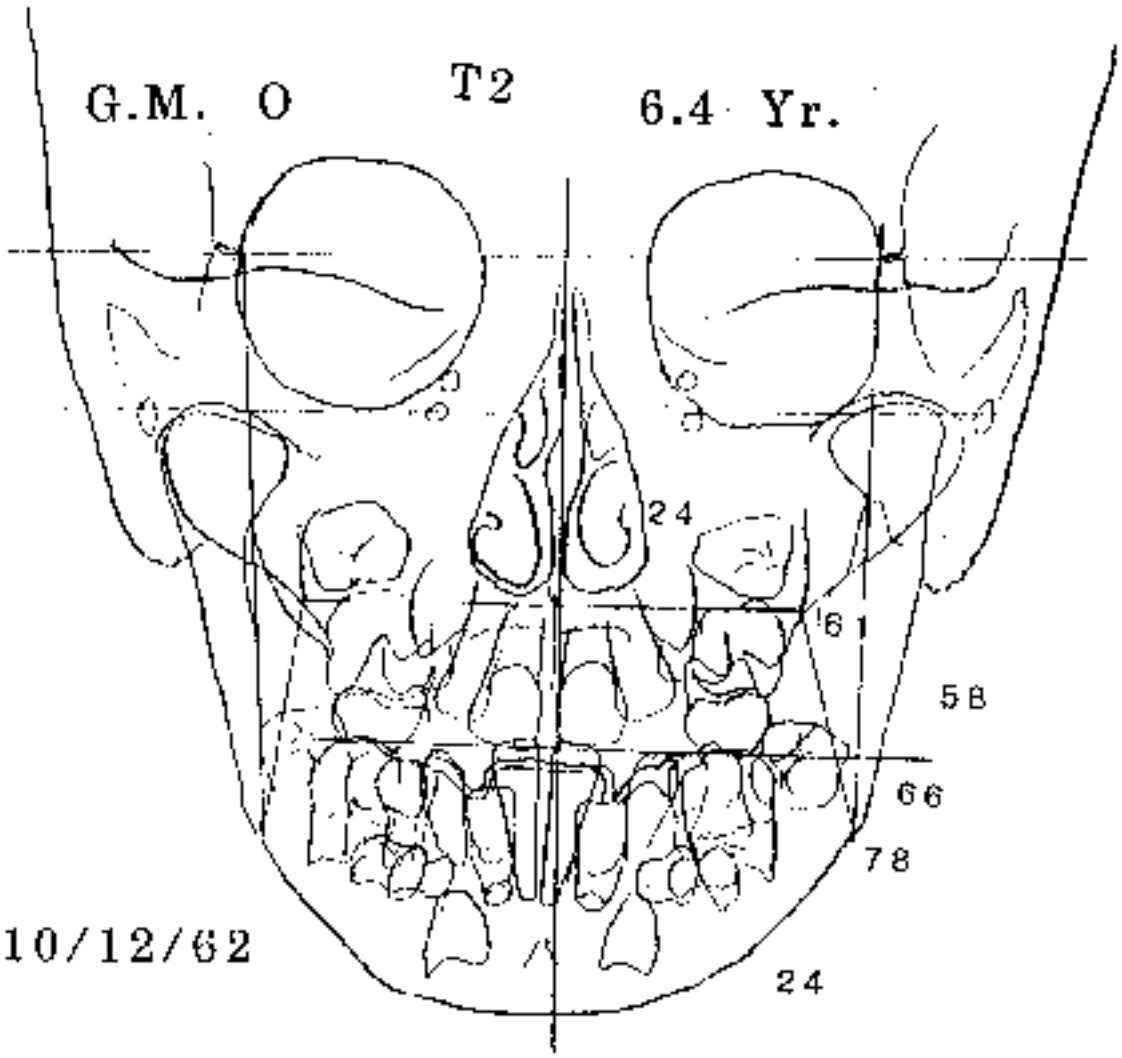
To 18.5 Yr.
If Untreated

FIG. 10-2-iv



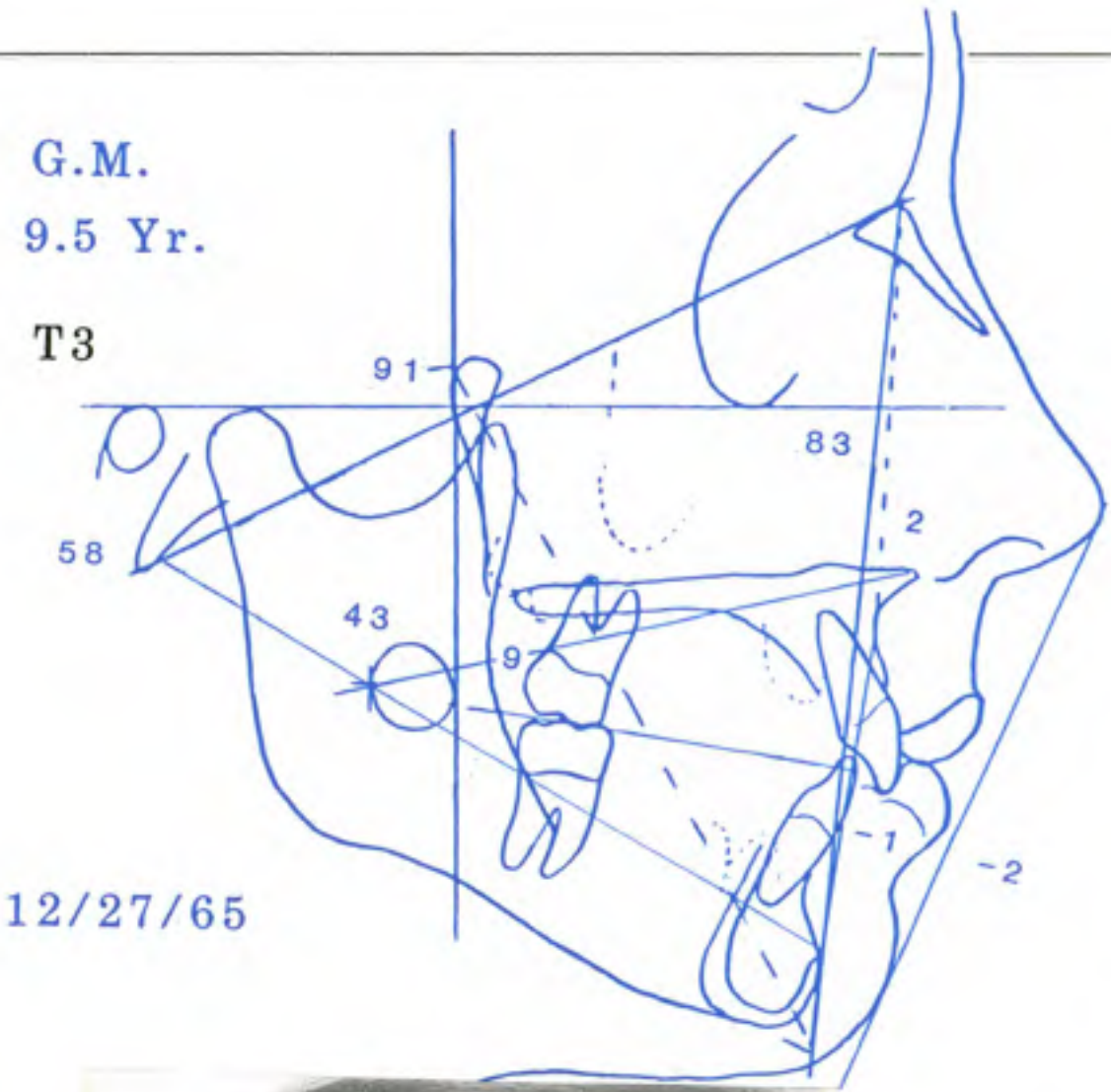
T2 Patient Greg at age 6,4. Note changes in molar and skeletal relations from T1. Note Arch changes from T1.

FIG. 10-2-v



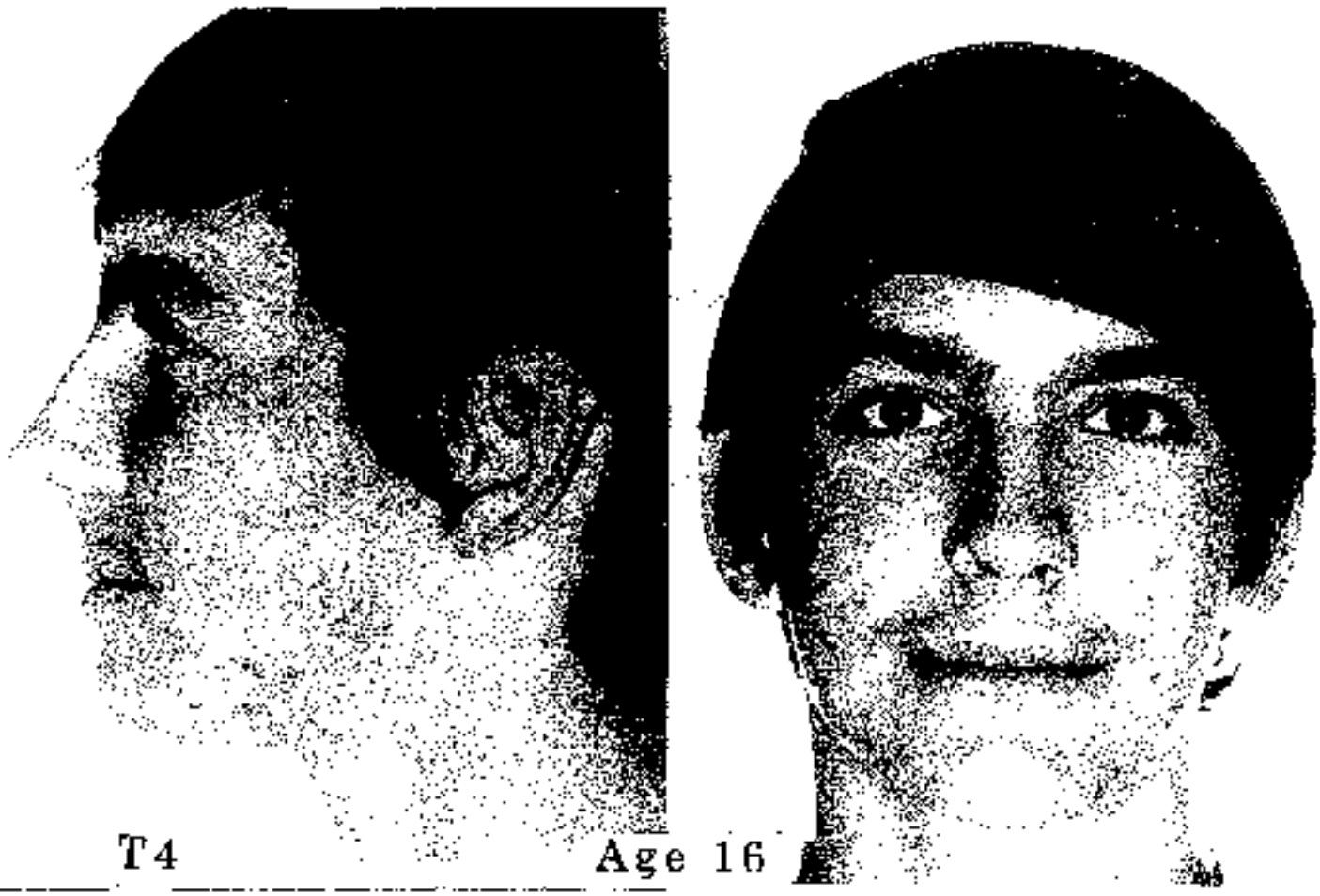
T2 Frontal on Greg. Both midlines are still off center from cranial references.

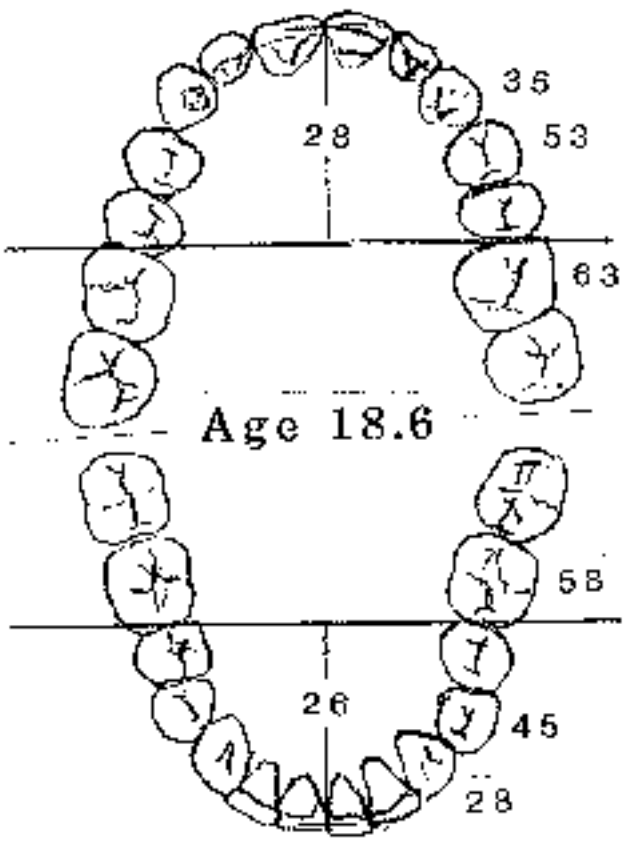
FIG. 10-2-vi



Greg at T3 – during treatment for the deep bite with utility arches at age 9.5 years.

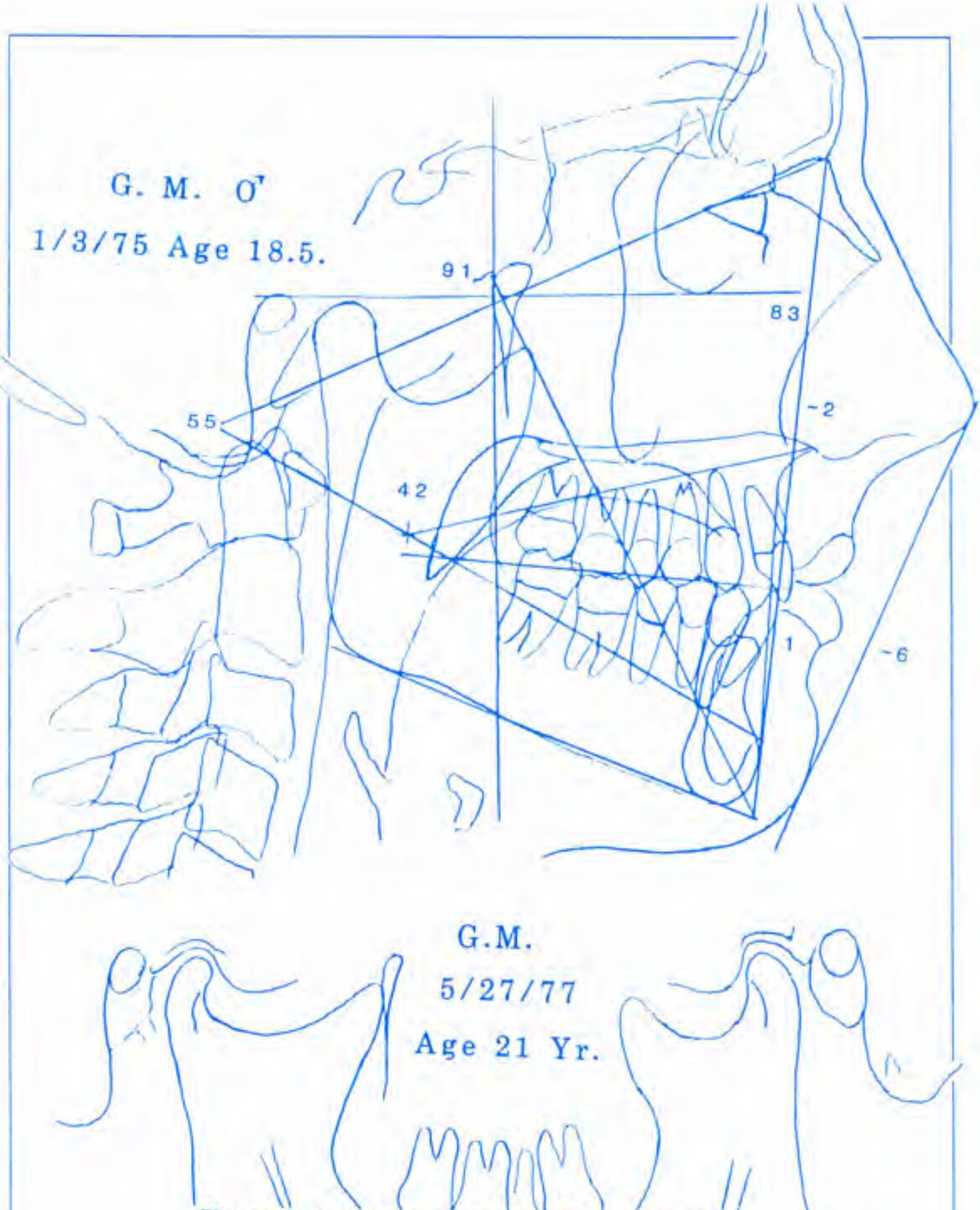
FIG. 10-2-vii





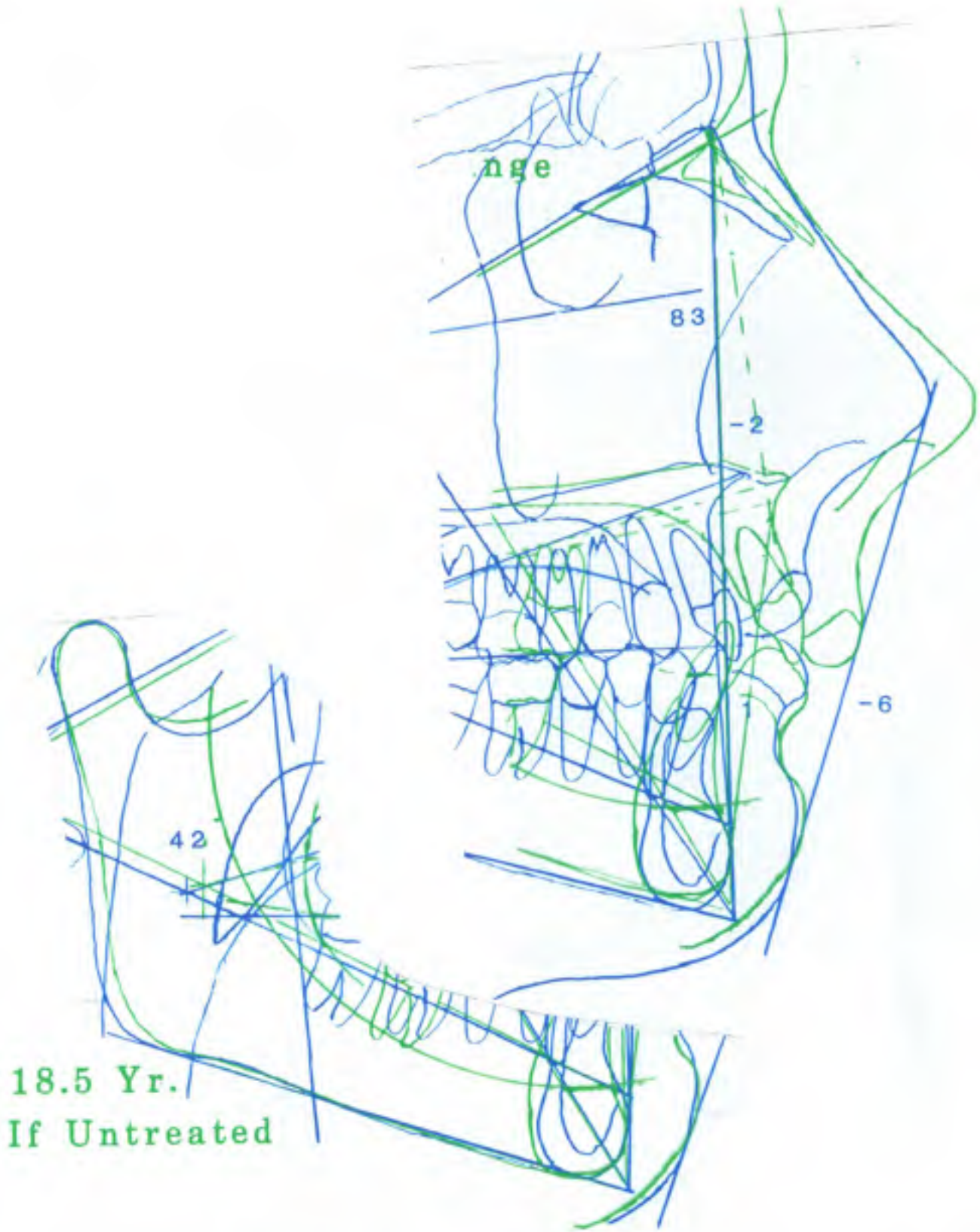
T4 Photos after retention at age 16 and occlusal dimensions at age 18.6 years.

FIG. 16-2-viii



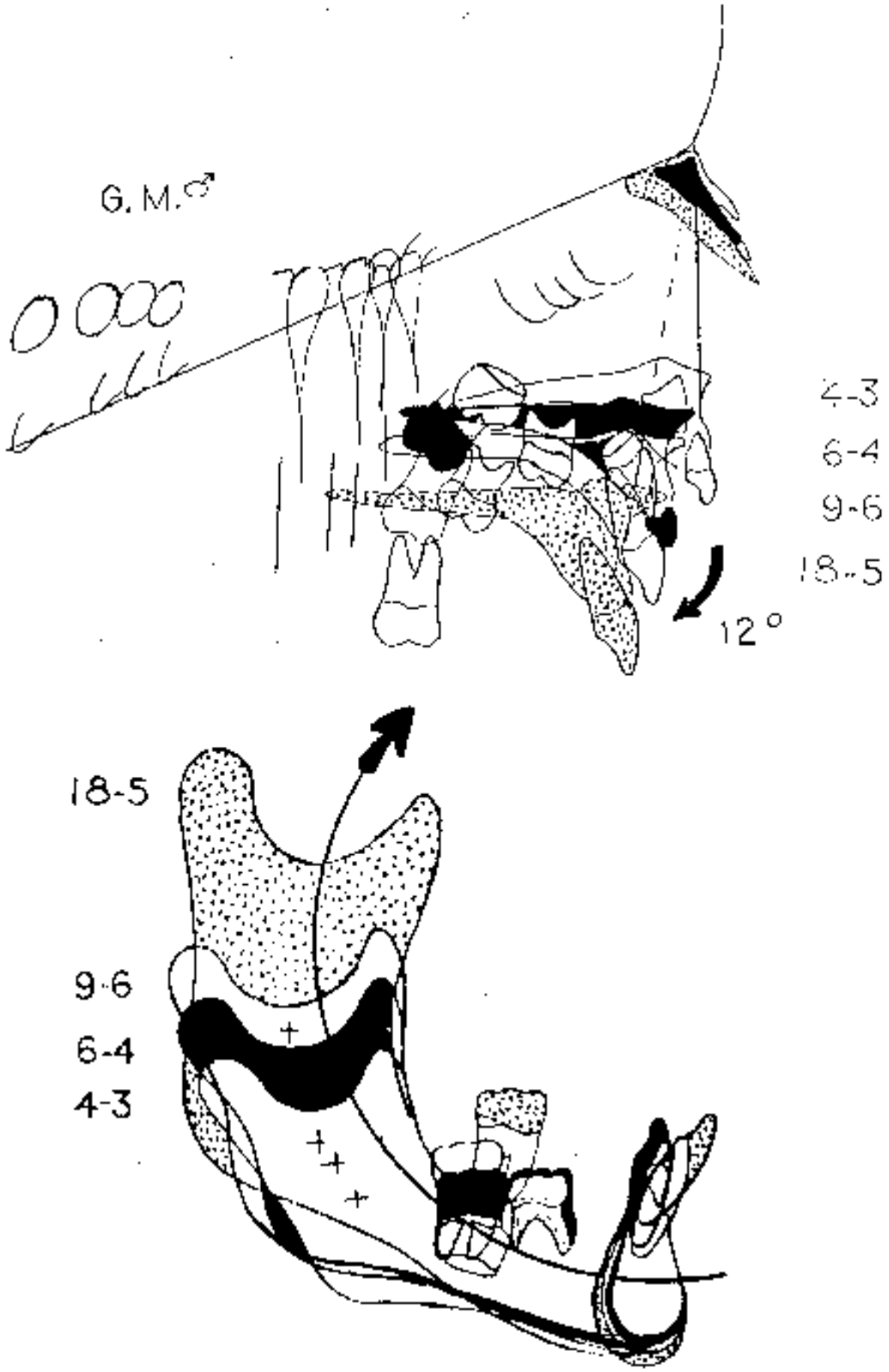
T6 at age 18.5 in 1975. Third molars were removed as advised by dentist. Note the slight concavity from an 8 mm. convexity. Note the beautiful condyle relation at age 21 years.

FIG. 10-2-ix



Comparison of the forecast from age 4.3 to 18.5 (14 years). Note the fit on the mandible. Note the very significant change in the midface.

FIG. 10-2-x



The progressive analysis on Position 2 shows a 12° reduction of Angle BaN to Point A. Below – Lower arcial expression.

FIG. 10-2-xi

Case #3 A.A.♂ - Class III with upper arch restriction

This boy was first seen at age 6.5 yrs and presentec with Class III anterior cross-bite **Fig. 10-3 series.** The mandibular concyle position was slightly forward but the chewing and speaking functions were made in the anterior crossbite positon. The VTG was made to the age of 14.6 years using the Class III formulas. The facial pattern suggested Class III development. The patient required no treatment later so unfortunately no further records could be obtained beyond age 14 years.

Treatment

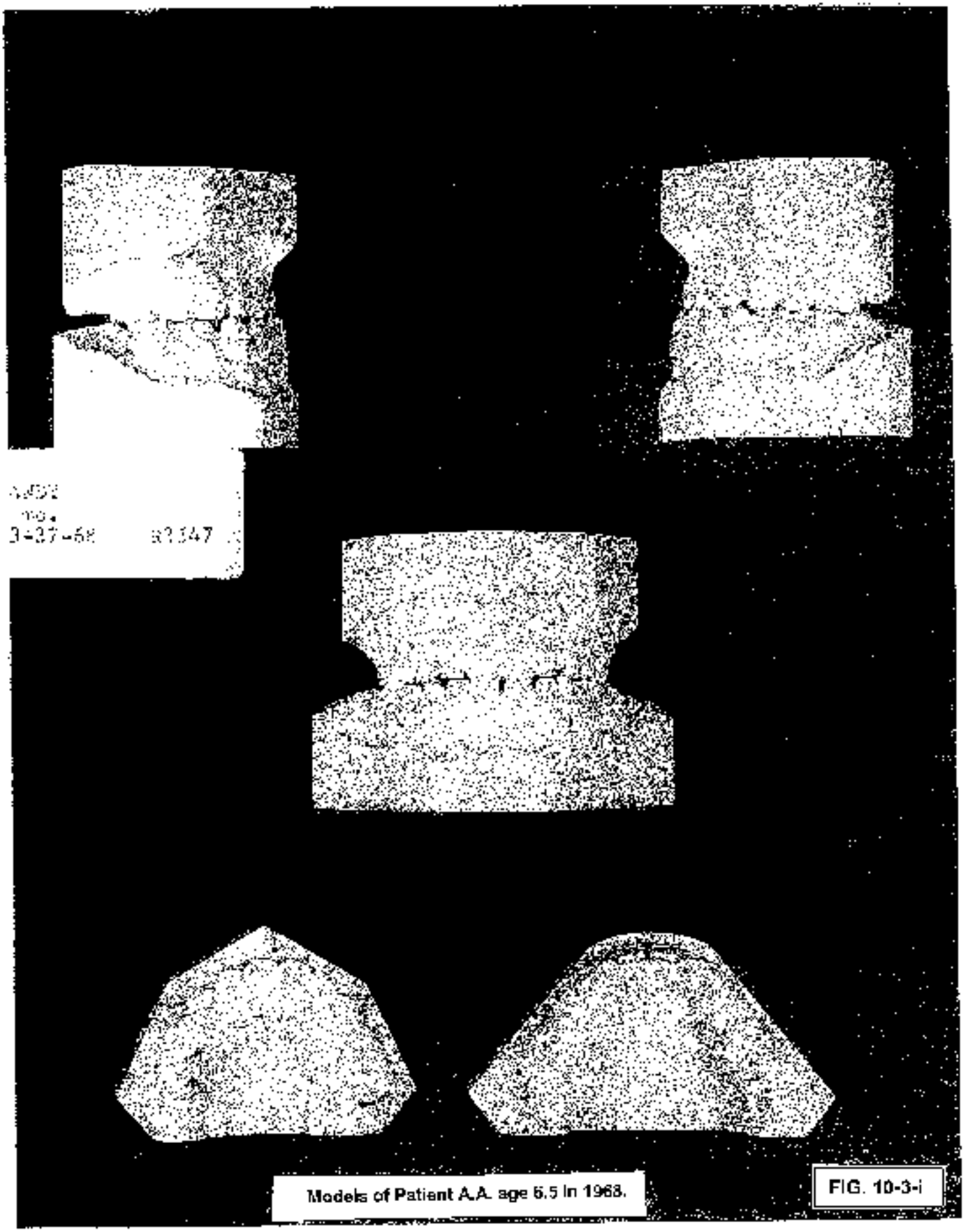
All four second deciduous molars were banded and the deciduous canines were brackeled. Ligatlons of anterior teeth were made with the old fashioned "neck ties".

Tip back was placed on the lower molars in order to offset the extrusive force of Class III intermaxillary elastics. A 150 gram elastic force was employec per side. Treatment was continued until a slight Class I was produced. Elastics were then worn every other night only with a pull of 100 grams for four months. The wires and brackets were removed and no further retention was necessary. The patient was stable at age 8.1 years.

No further treatment was required either in the mixed or the permanent dentition. He was last seen at age 14.6 years. Comparison of the forecast suggested an inhibition of mandibular growth.

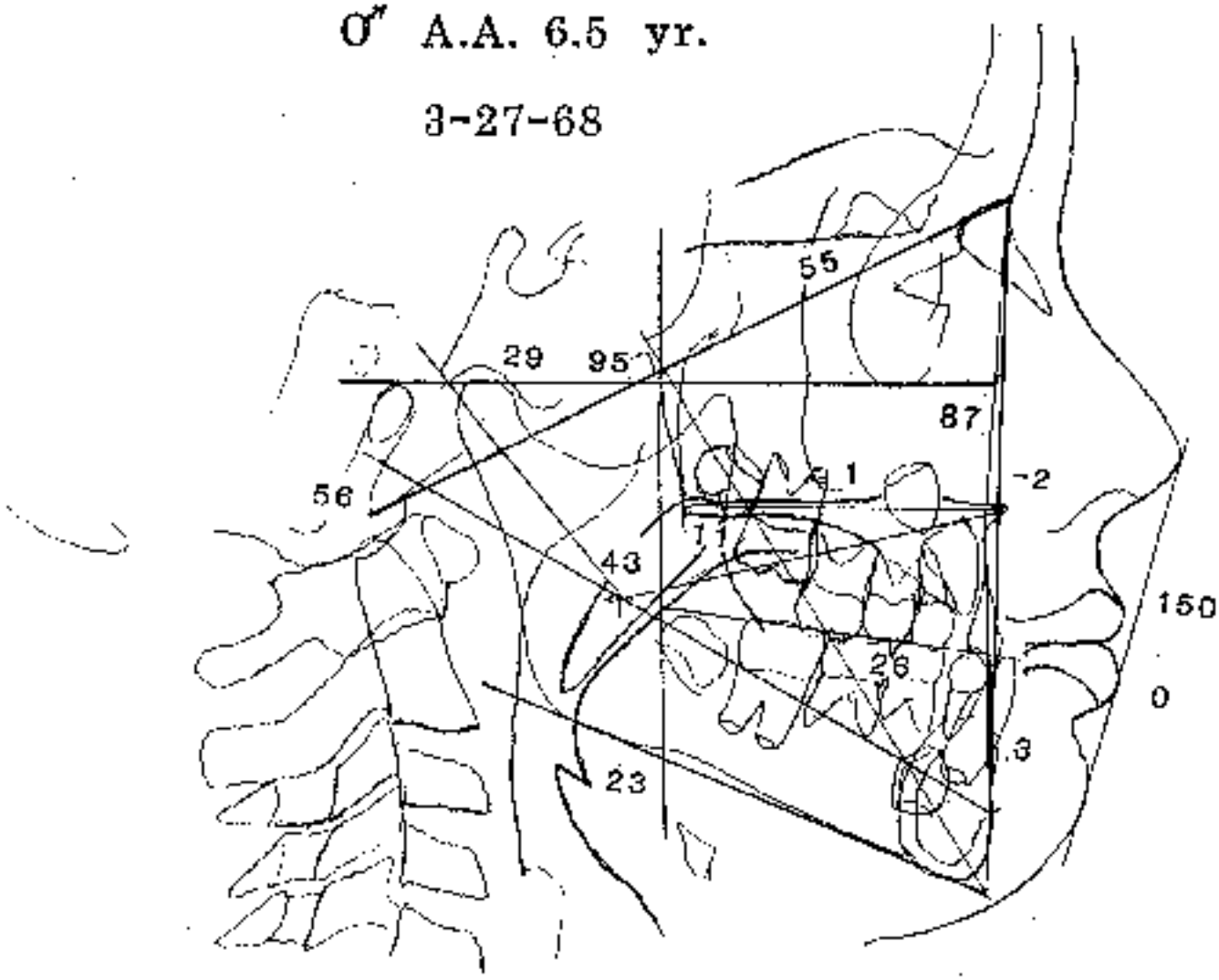
Comments

These three patients were selected to demonstrate possibilities of correction at the "preventive phase". Three types of crossbite were demonstrated. Open bite and deep bite were shown in Class II. In one patient, no second treatment was necessary. In one patient, permanent upper first molar rotation was conducted later. The deep bite (Brodie Syndrome) required three phases, one for the buccal crossbite Class II, one for the deep bite and the last being only for detailed straight wire finishing.



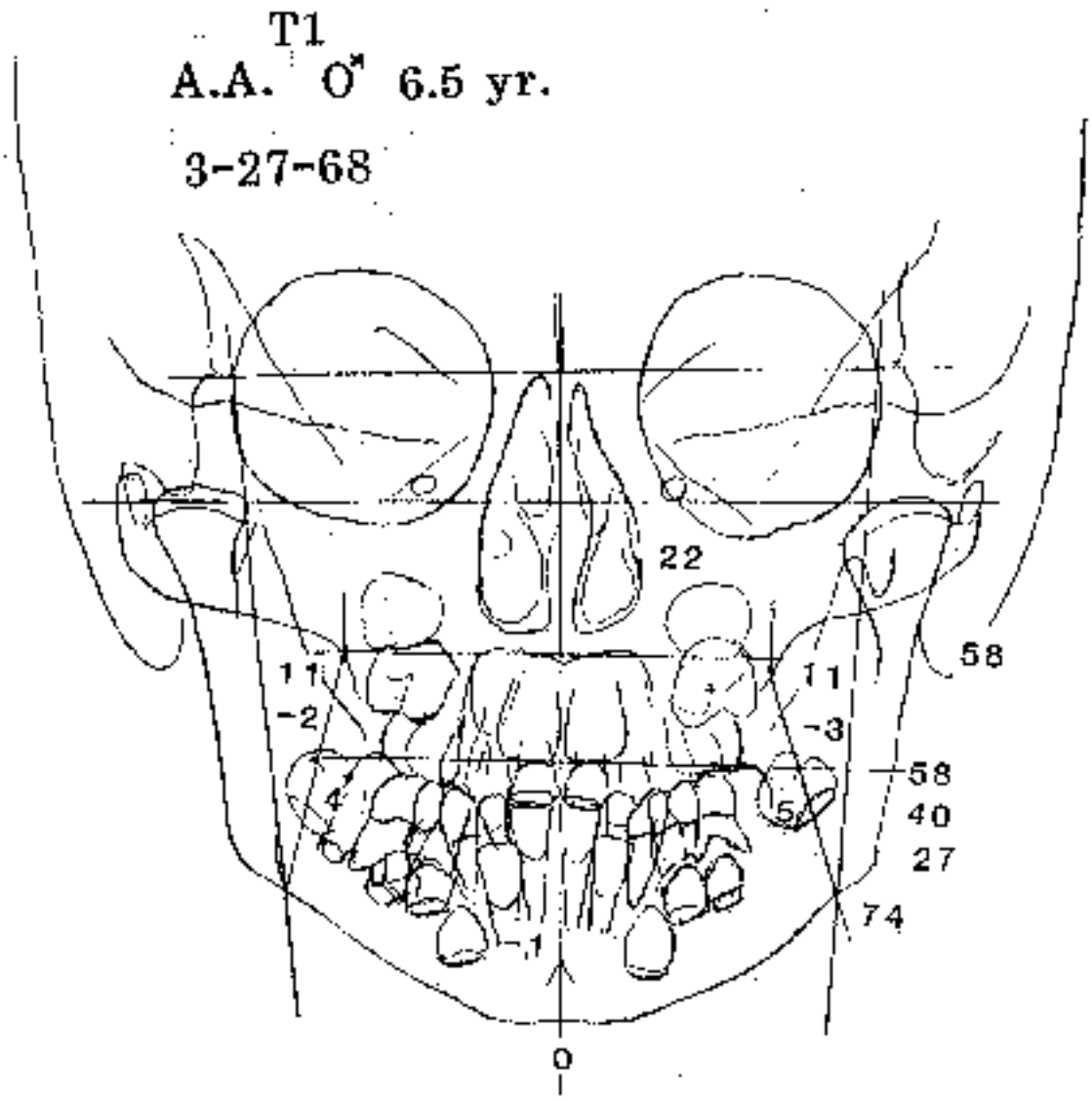
Models of Patient A.A. age 6.5 in 1968.

FIG. 10-3-i



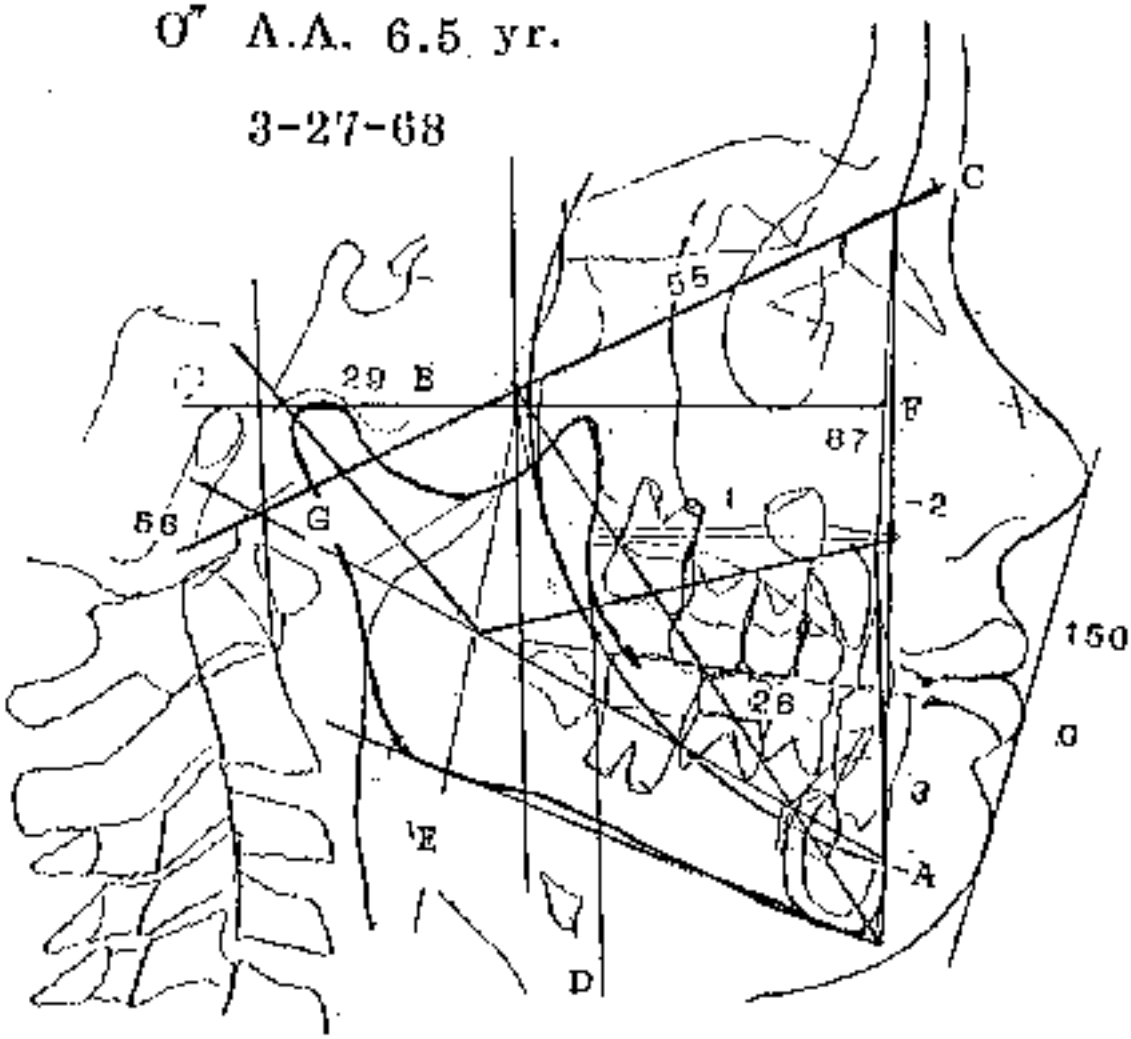
Lateral showing prognathic Class III tendency Facial Axis 95° and long slender condyle and obtuseness.

FIG. 10-3-ii



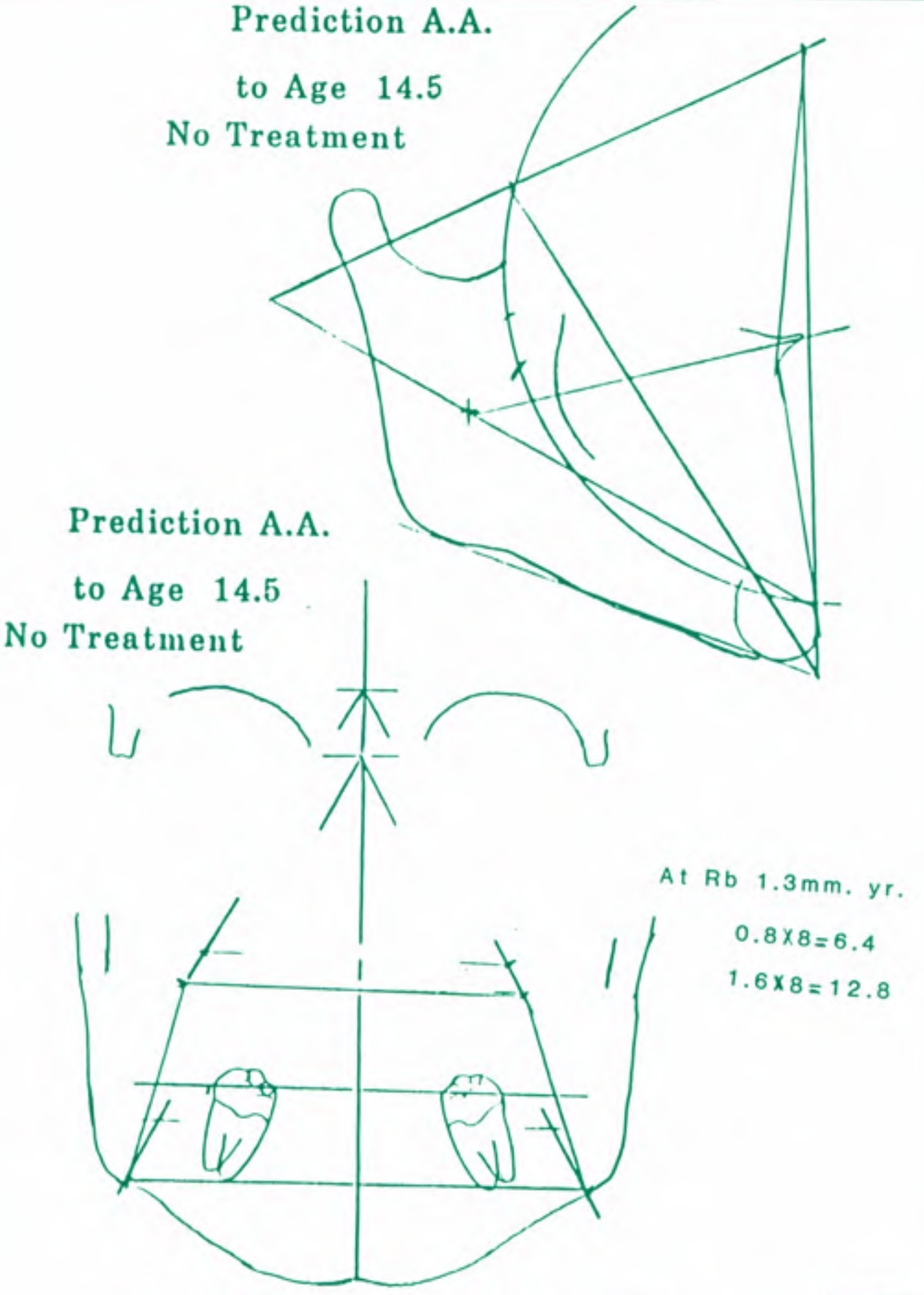
Frontal of Andy at age 6.5. Note good symmetry and width.

FIG. 10-3-iii



The T1 tracing prepared for forecasting A. the arc, B. the condyle (posterior base), C. the anterior base, D. the Rr line, E. the Xi Axis, F. the N-A line, G. the articular point.

FIG. 10-3-iv



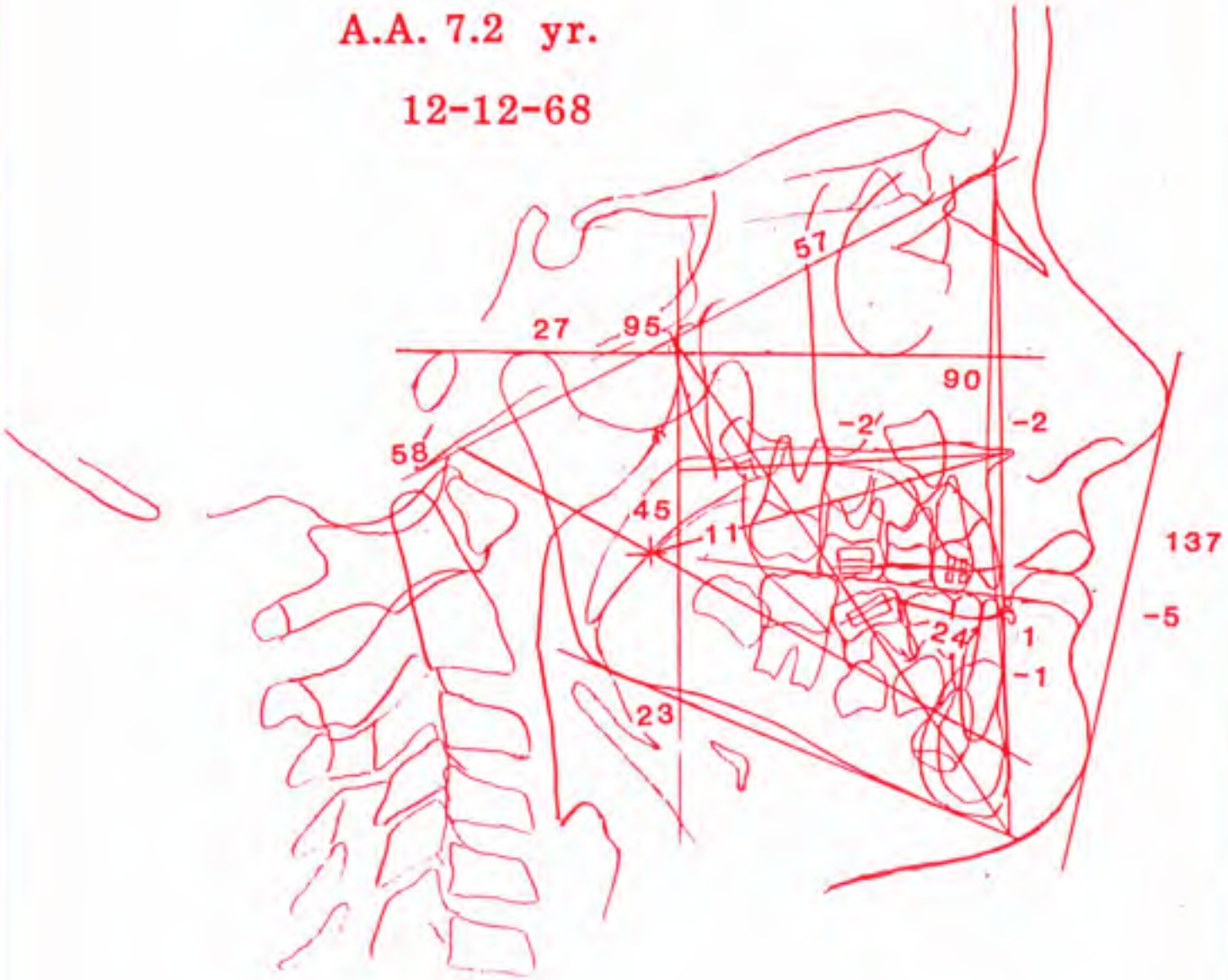
Lateral and Frontal Forecasts for Andy to age 14.5 no treatment.

FIG. 10-3-v

T2

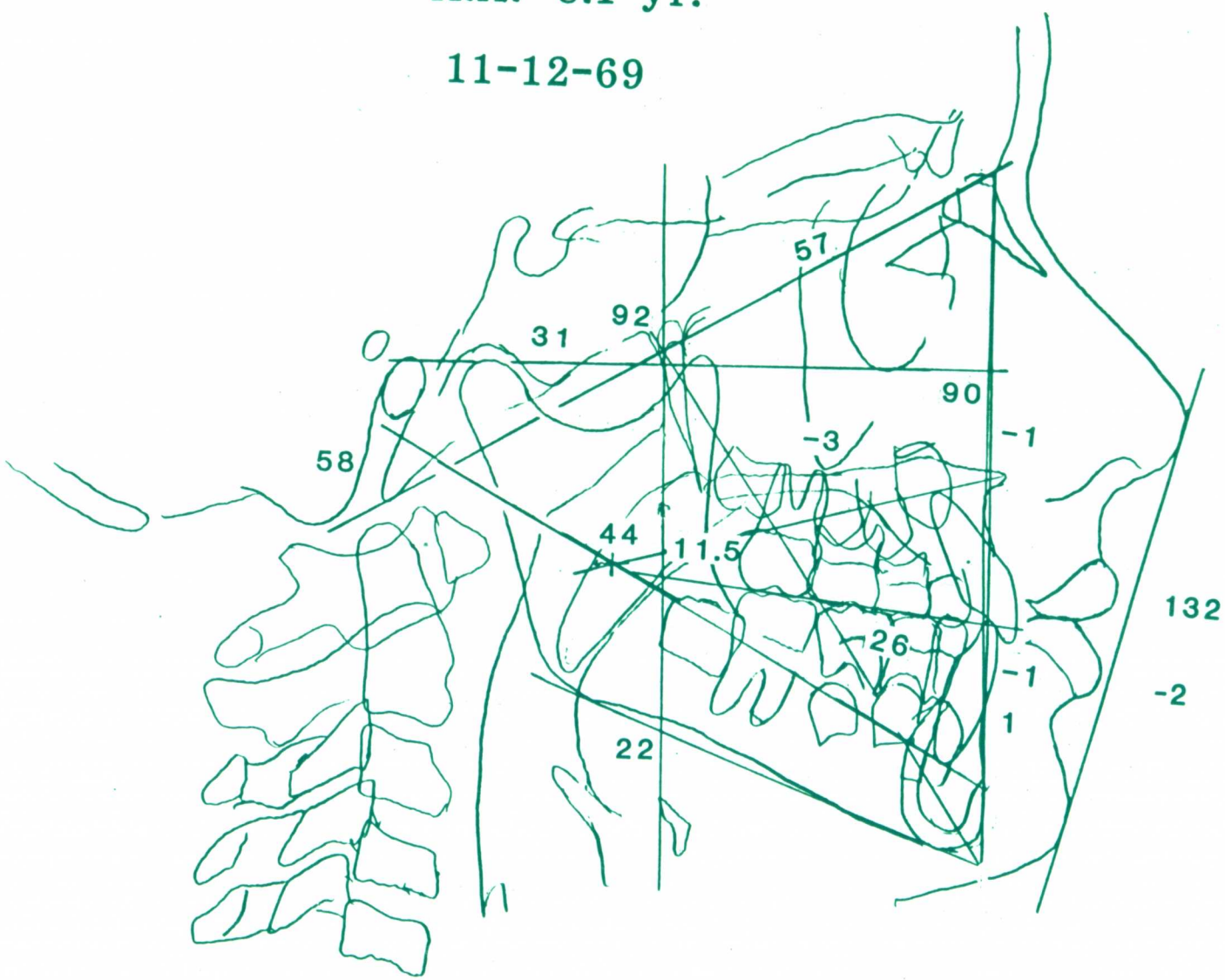
A.A. 7.2 yr.

12-12-68



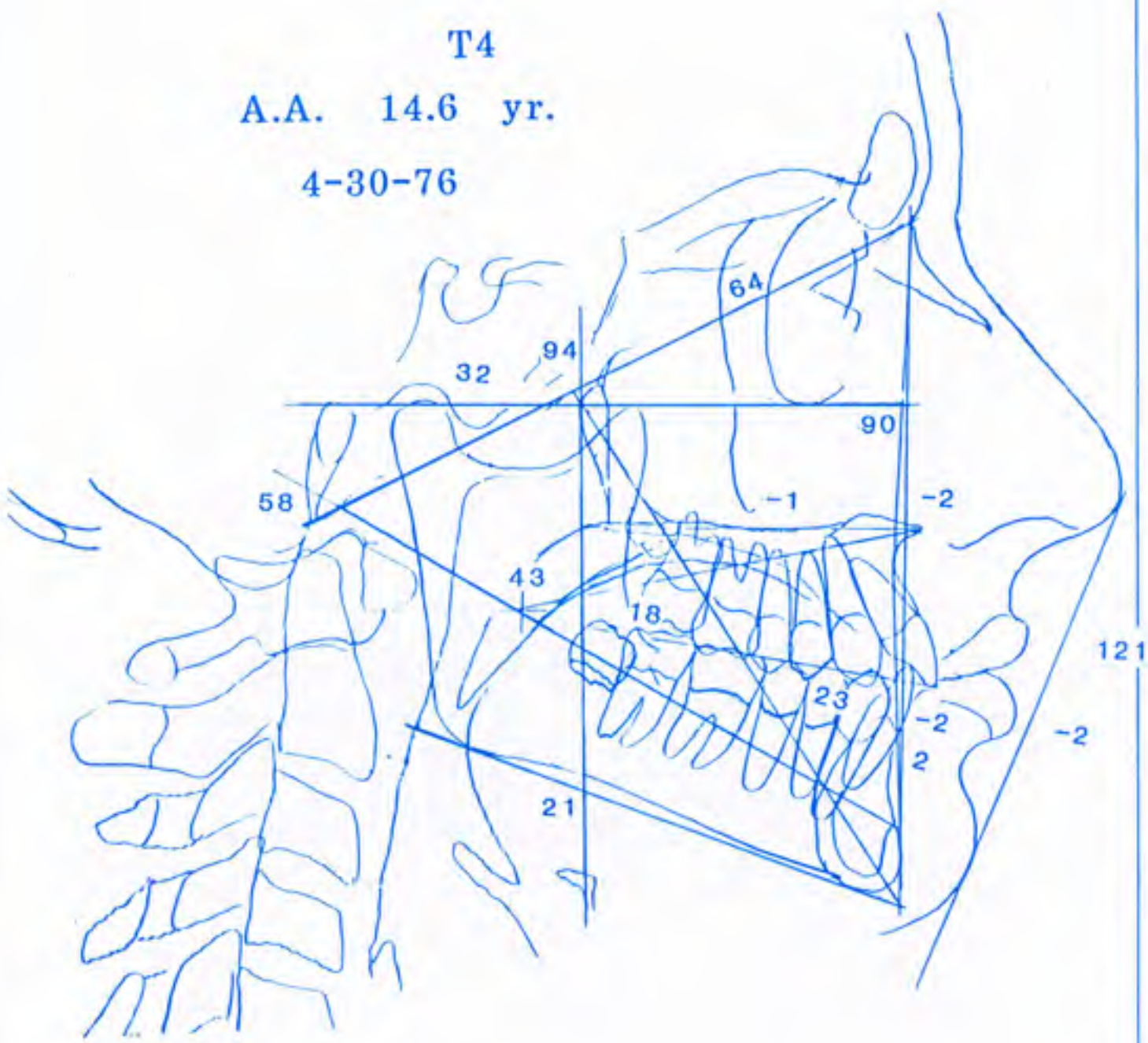
T2 Straight wires and Class III elastics being worn. Molars banded, upper canines bracketed and incisors ligated, lower incisors bracketed. Patient was treated beyond normal.

FIG. 10-3-vi



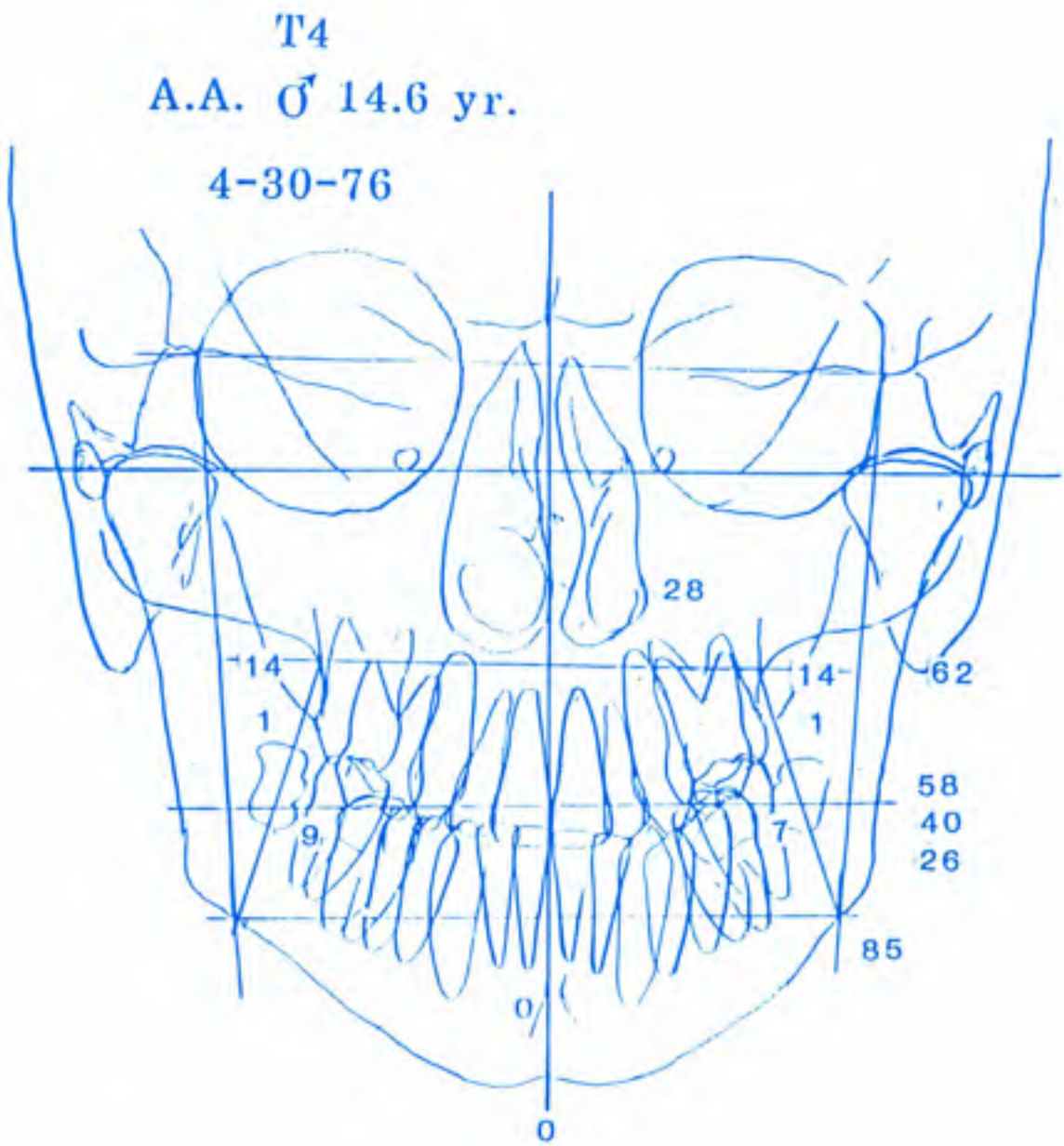
T3 Progress film – no treatment, no retention at age 8.1.

FIG. 10-3-vii



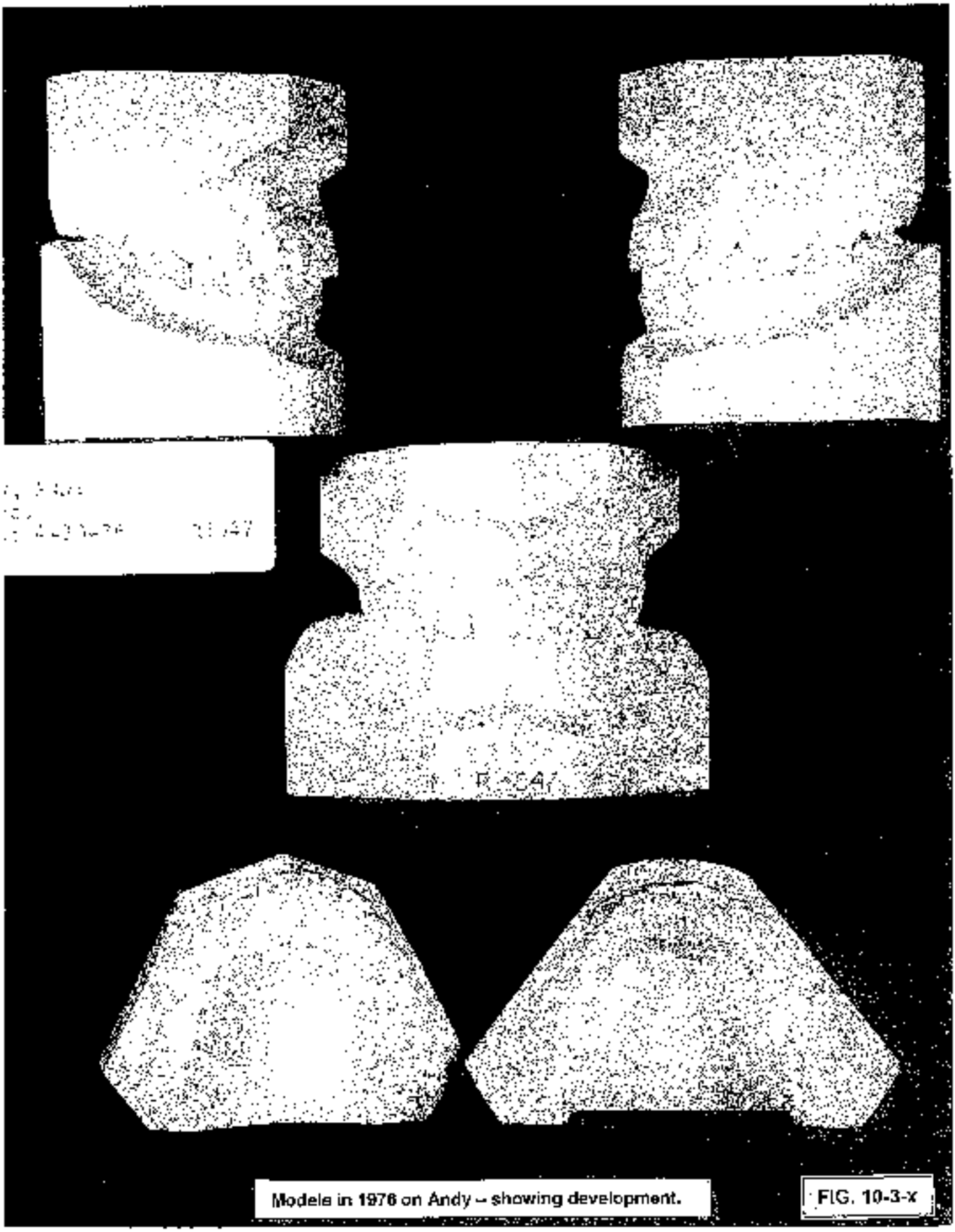
T4 Andy's conditionat age 14.6, no treatment in either the mixed or permanent phase.

FIG. 10-3-viii



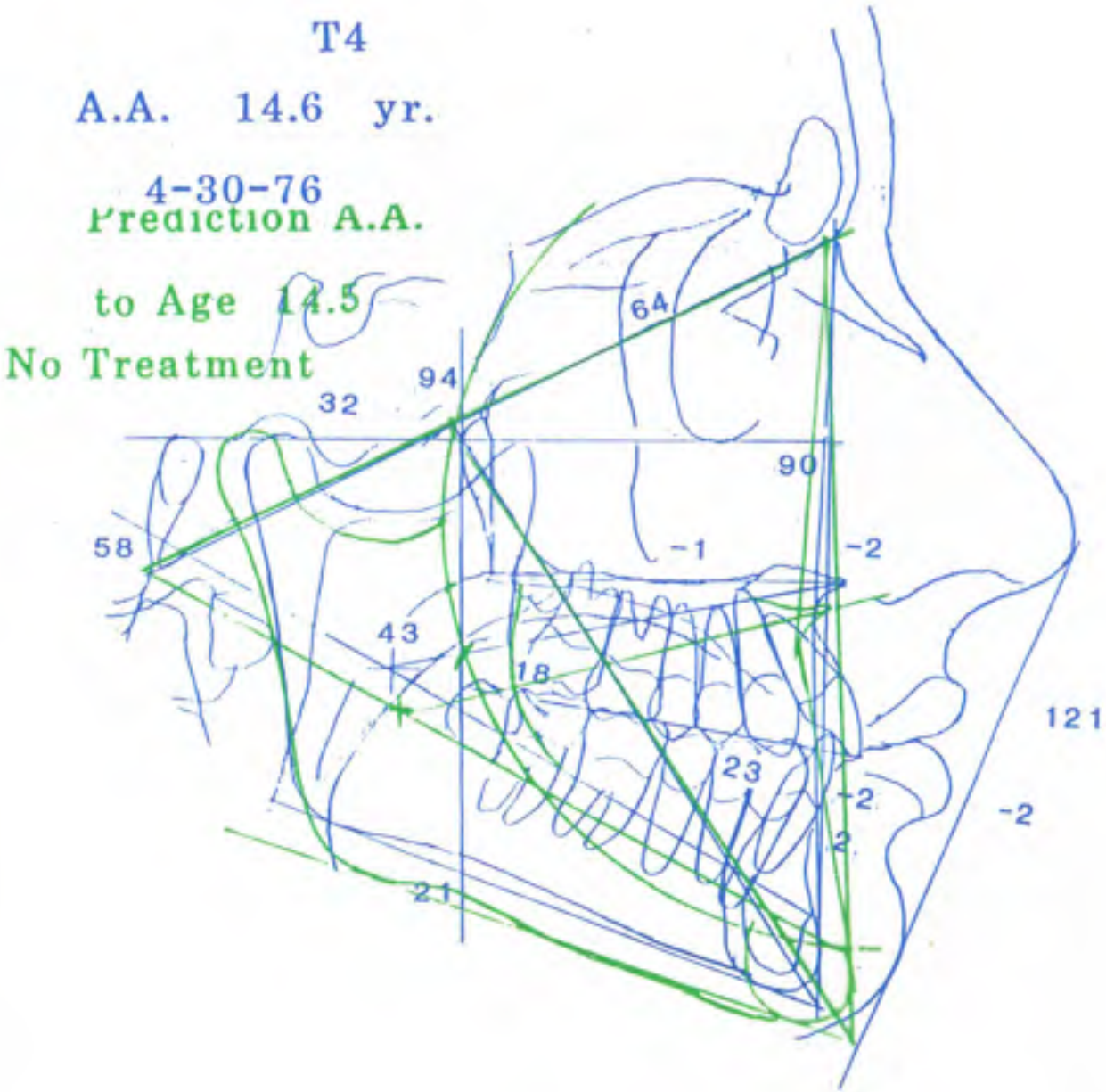
Frontal at age 14.6 on Andy.

FIG. 10-3-ix



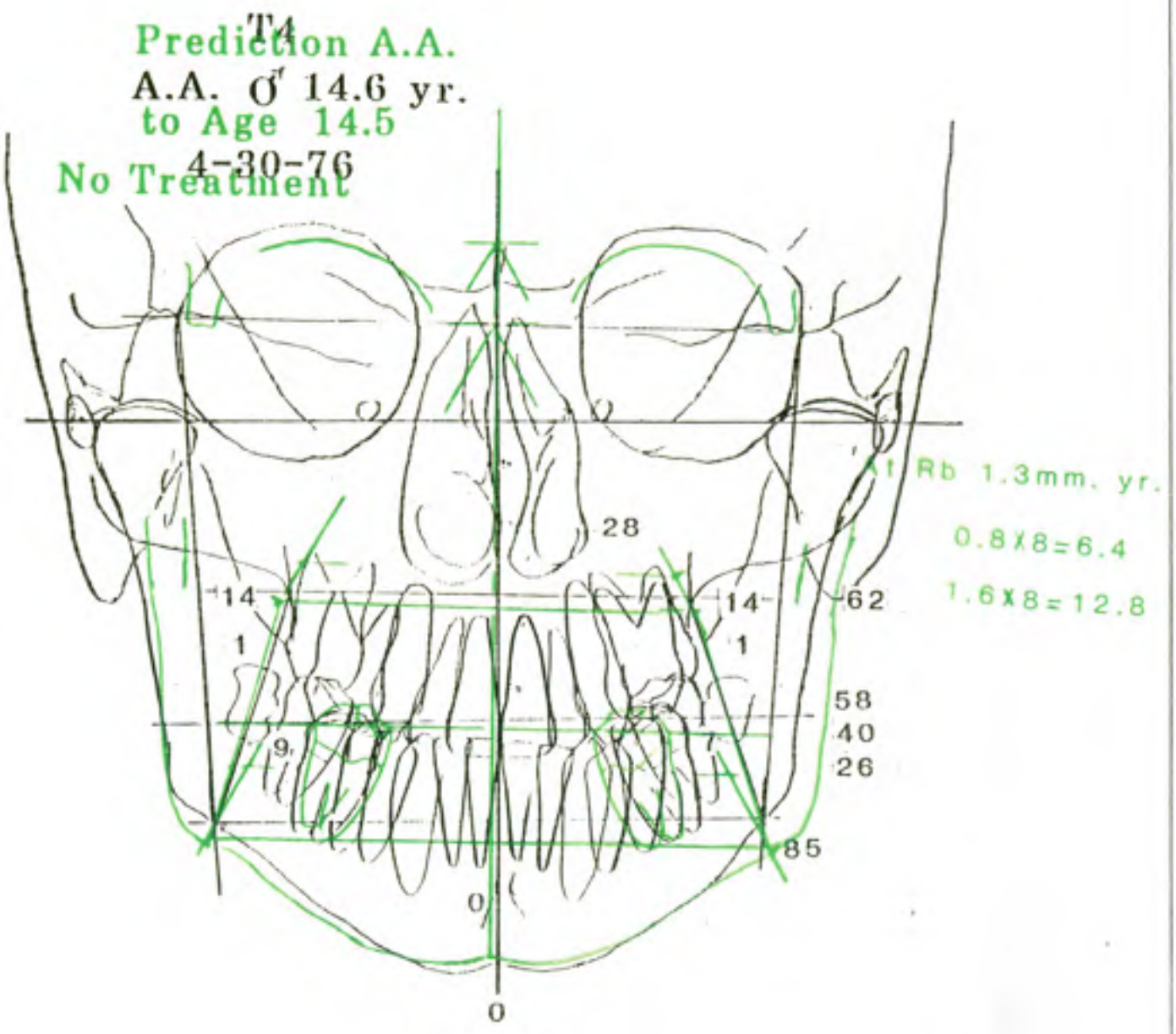
Models in 1976 on Andy – showing development.

FIG. 10-3-x



Comparison of Forecast without treatment to the Actual at age 14.5. Note the containment of the mandible and change in form from the predicted.

FIG. 10-3-xi



Comparison of the Forecast to the Actual in the frontal.

FIG. 10-3-xii

III. EARLY MIXED DENTITION WITH GROWTH RECORDS AVAILABLE BEFORE TREATMENT - *Group Two*

Growth Records for a Second Basis for Proof of "Orthopedics"

It has been argued by some that backward growth of the maxilla is normal and that such would have occurred without treatment. We cannot find children with that behavior without treatment or a cleft palate scar. One was presented to the author by a colleague only to be shown that it was due to a mistaken selection of Nasion in the Time 2 tracing.

Case #4 B.C.? Deciduous to Mixed Class II Open Bite

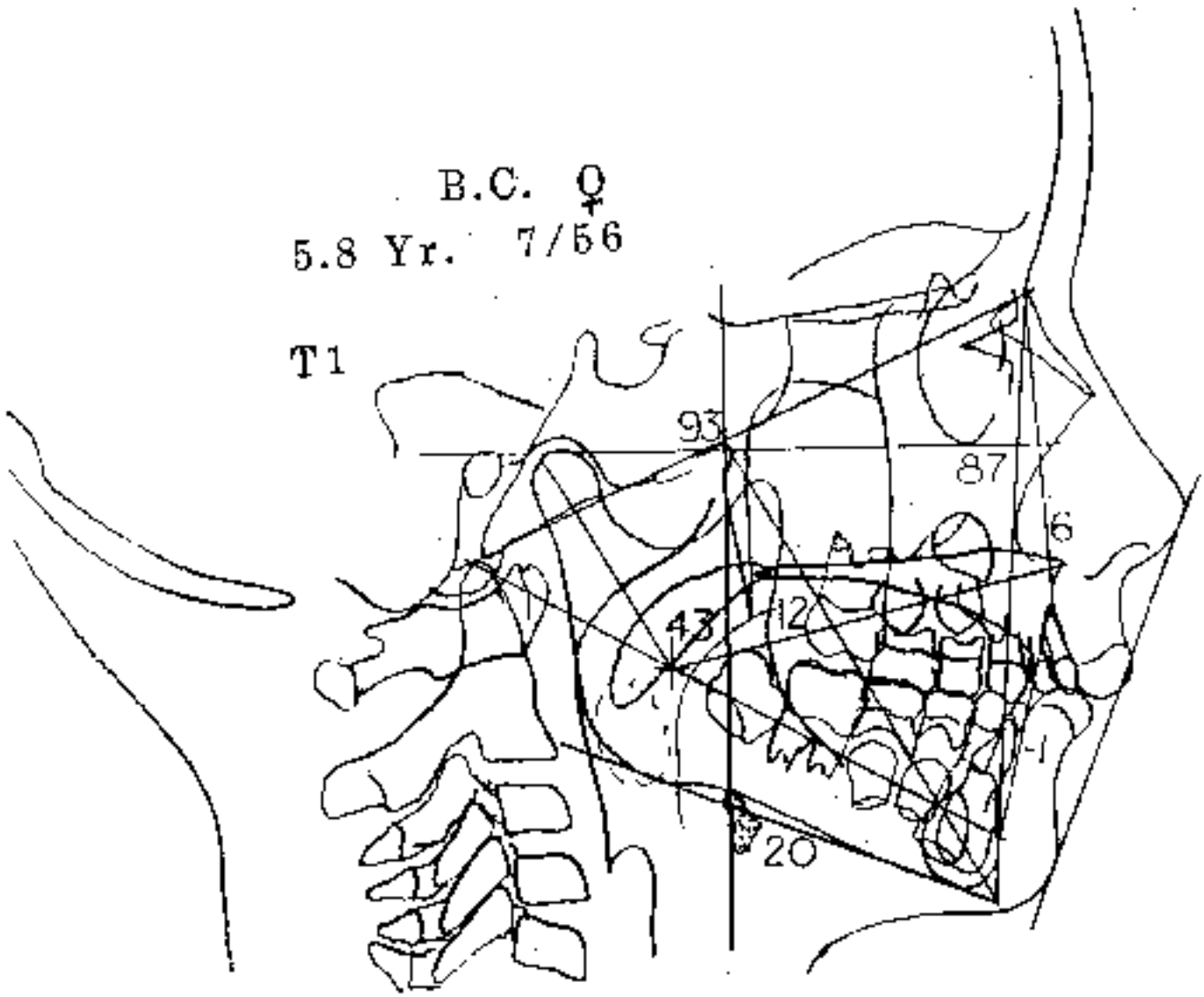
An older sister of this patient was being treated and the parents didn't want to take on the costs of two children together. A severe Class II open bite was present in a brachy facial pattern at age 5.8 years (**Fig. 10-4-i**). Thumb sucking was also a problem. The patient was given a "chance" for improvement with growth.

With the eruption of the permanent incisors, the condition had worsened despite a forward development. The Maxillary Angle (BaNA) did not change (**Fig. 10-4-ii**).

Treatment

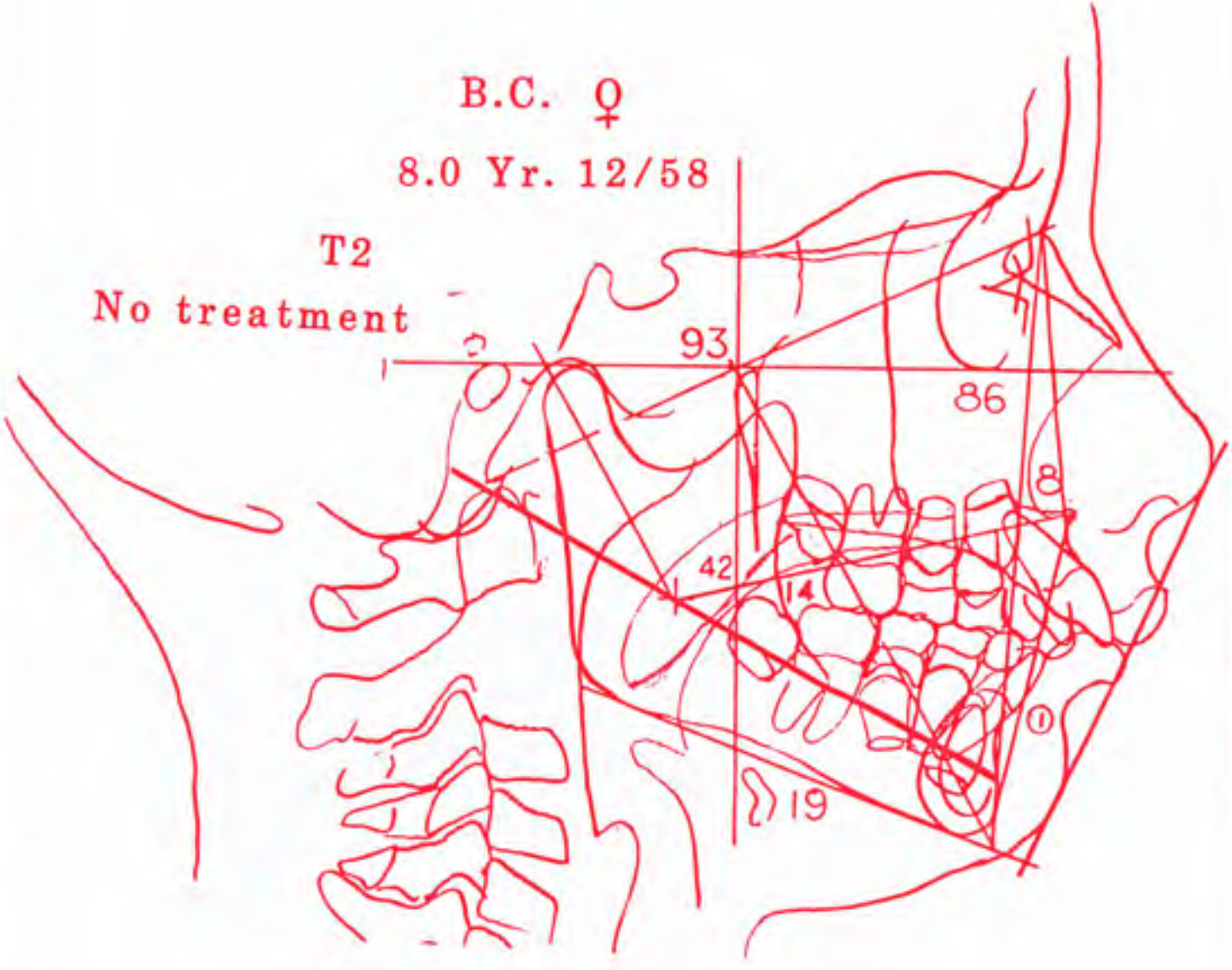
Treatment with the face bow was started at age 8.0 years. The dental bow was rested gently against the anterior teeth as the arch form was changed from tapered to normal. Normal arch relation was attained as later the cervical pull was alternated with an "occipital pull". No other treatment was employed (**Fig. 10-4-iii**). By age 17.7 years, records showed that maxillary orthopedics was stable.

At age 25, the patient had no 'relapse' toward Class II. The lower arch was never treated at all (except for influences from the head gear). It was clear that treatment could have been more effective had it been conducted in the deciduous dentition or with second deciduous molar. The waiting only witnessed a worsening of the Class II and the maxillary incisor protrusion.



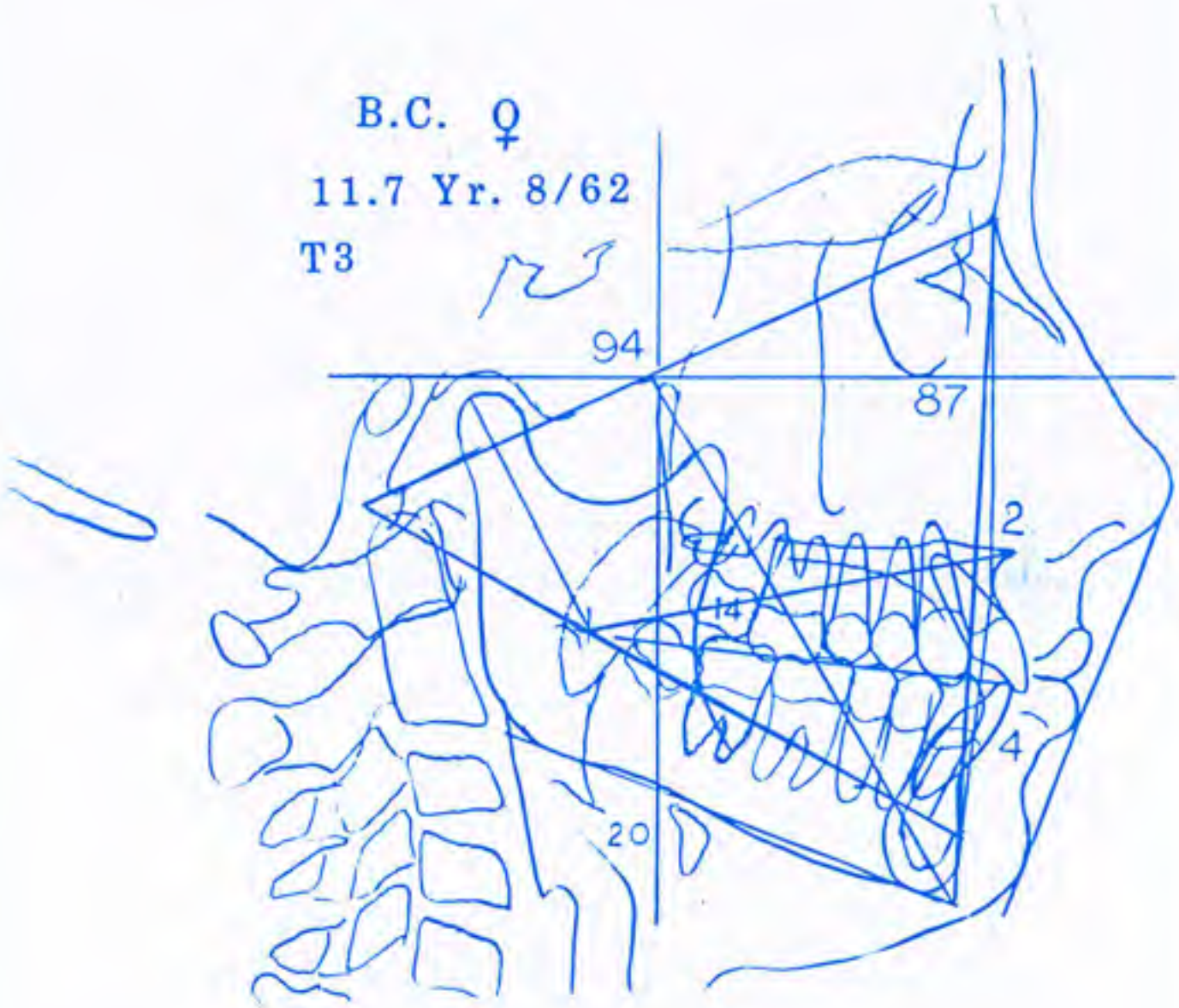
Time 1 B.C. female age 5.8 years with open bite thumb sucking. Parents decided (the two children) to treat older one. Note Class II in deciduous dentition in brachyfacial pattern but 6 mm. convexity. Note tonsil and high hyoid position with tongue posturing. Compare to 10-4-II (untreated).

FIG. 10-4-i



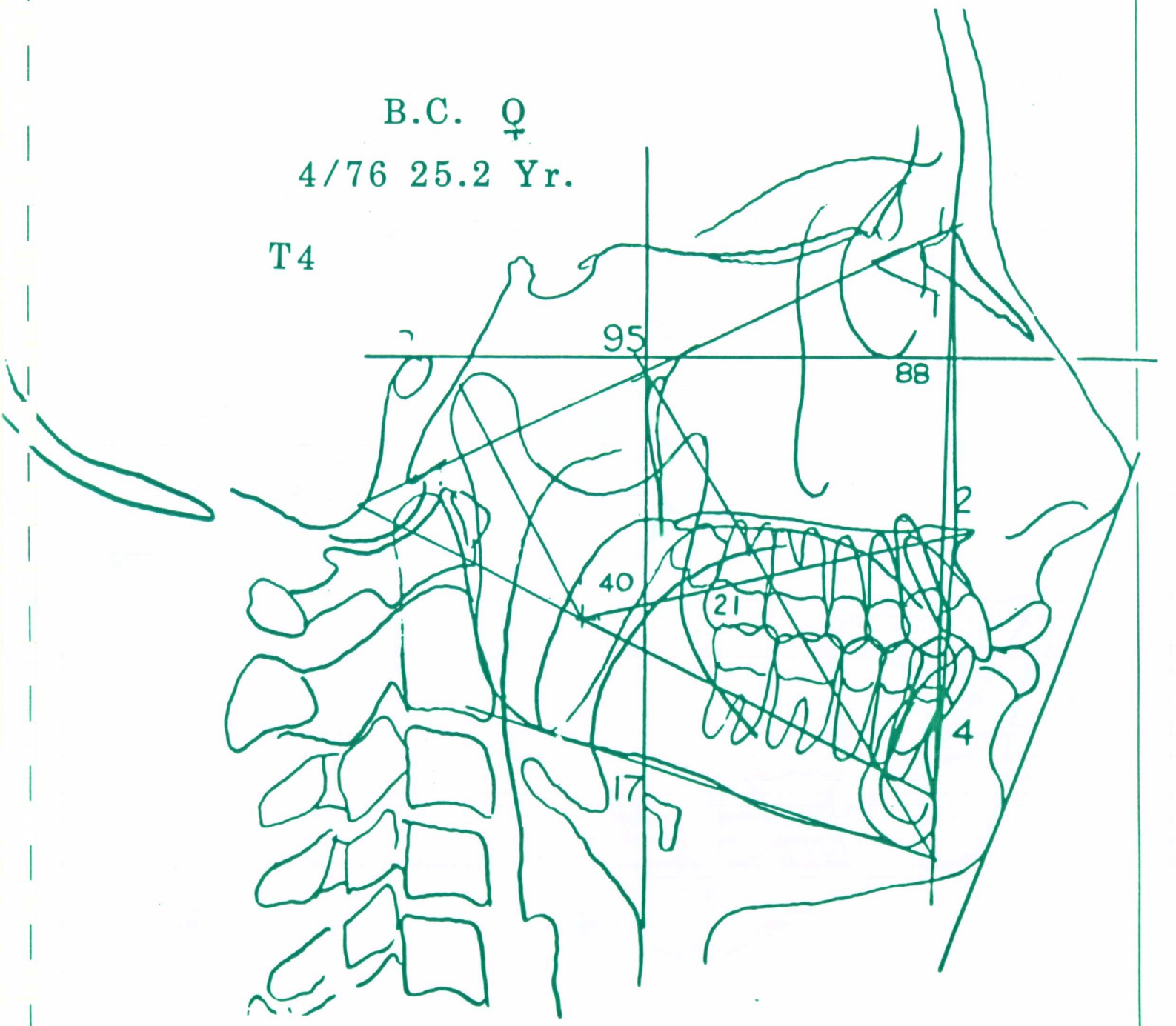
Time 2 two years four months later in the mixed dentition. Despite forward development of the chin, the malocclusion worsened with the permanent incisors present.

FIG. 10-4-ii



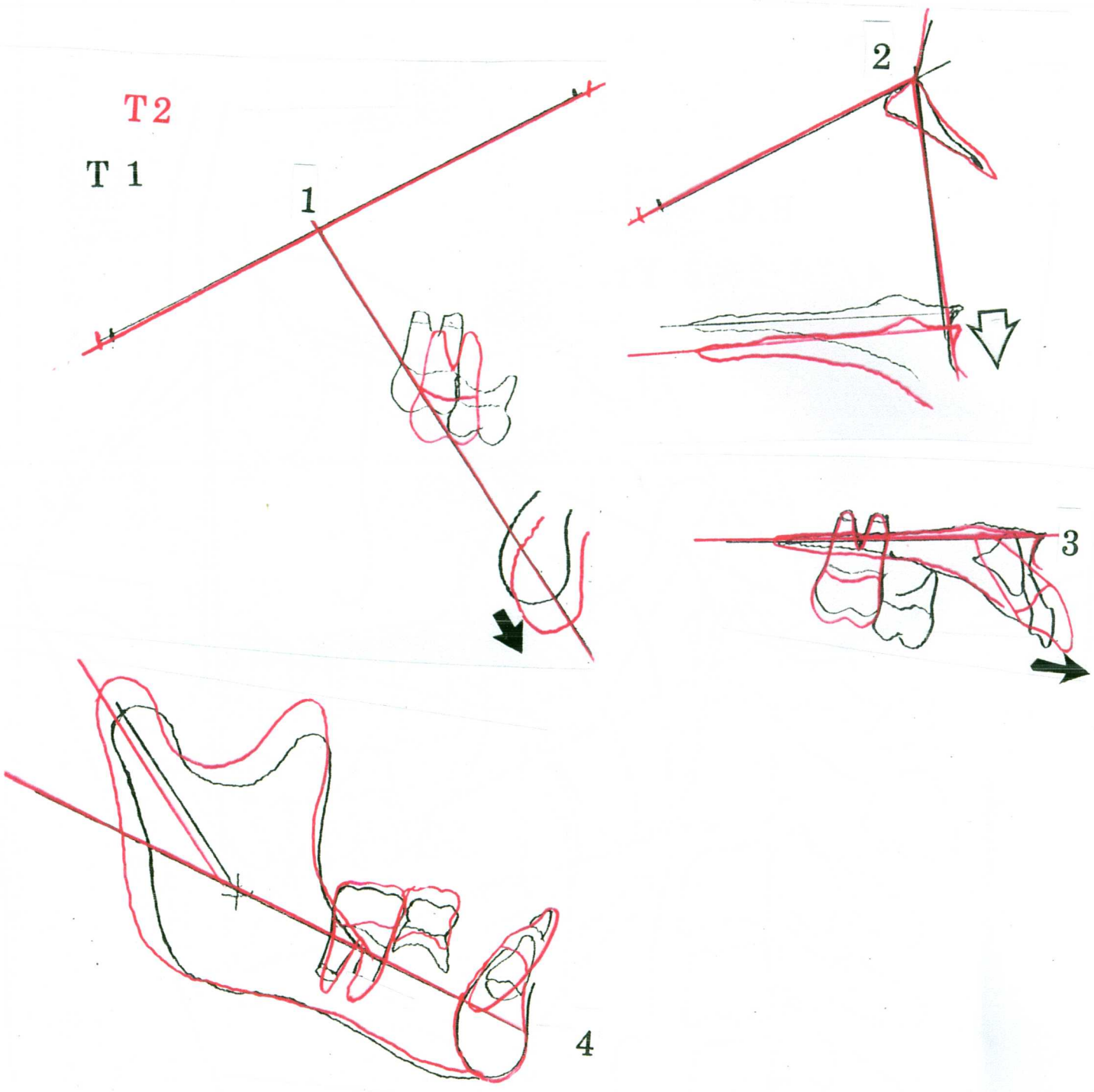
Time 3 in Barbara at age 11.7 years. Head gear only (2 bands) had been employed for 14 months. Holding was applied for 1 year, no other treatment was ever conducted. Note a 4 mm. protrusion of the lower incisor to the APo Plane. The 8 mm. convexity was reduced to 2 mm.

FIG. 10-4-iii



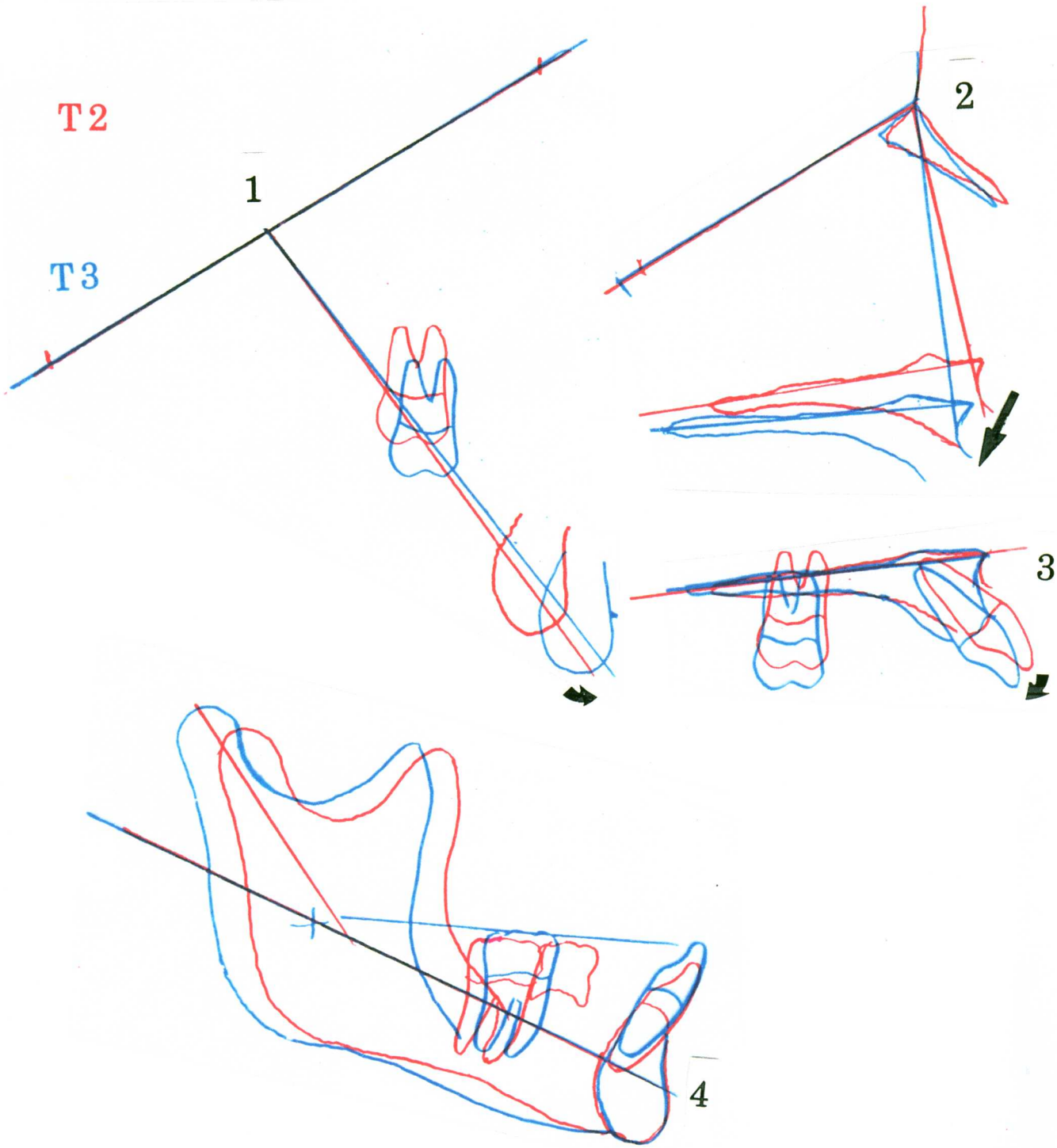
Time 4 – the same patient at 25 years, 14 years later. No treatment was conducted in the permanent level. Note the 95° Facial Axis and the 2 mm. convexity maintained.
The patient demonstrates the orthopedic–orthodontic potential of two molar bands and a face bow. Patient also had some high-pull but very little due to the growth pattern.

FIG. 10-4-iv



Comparison of T1 and T2 for growth untreated from deciduous to the mixed dentition. Note the stability of BaNA at Position 2 and the worsening of the incisor protrusion in Position 3.

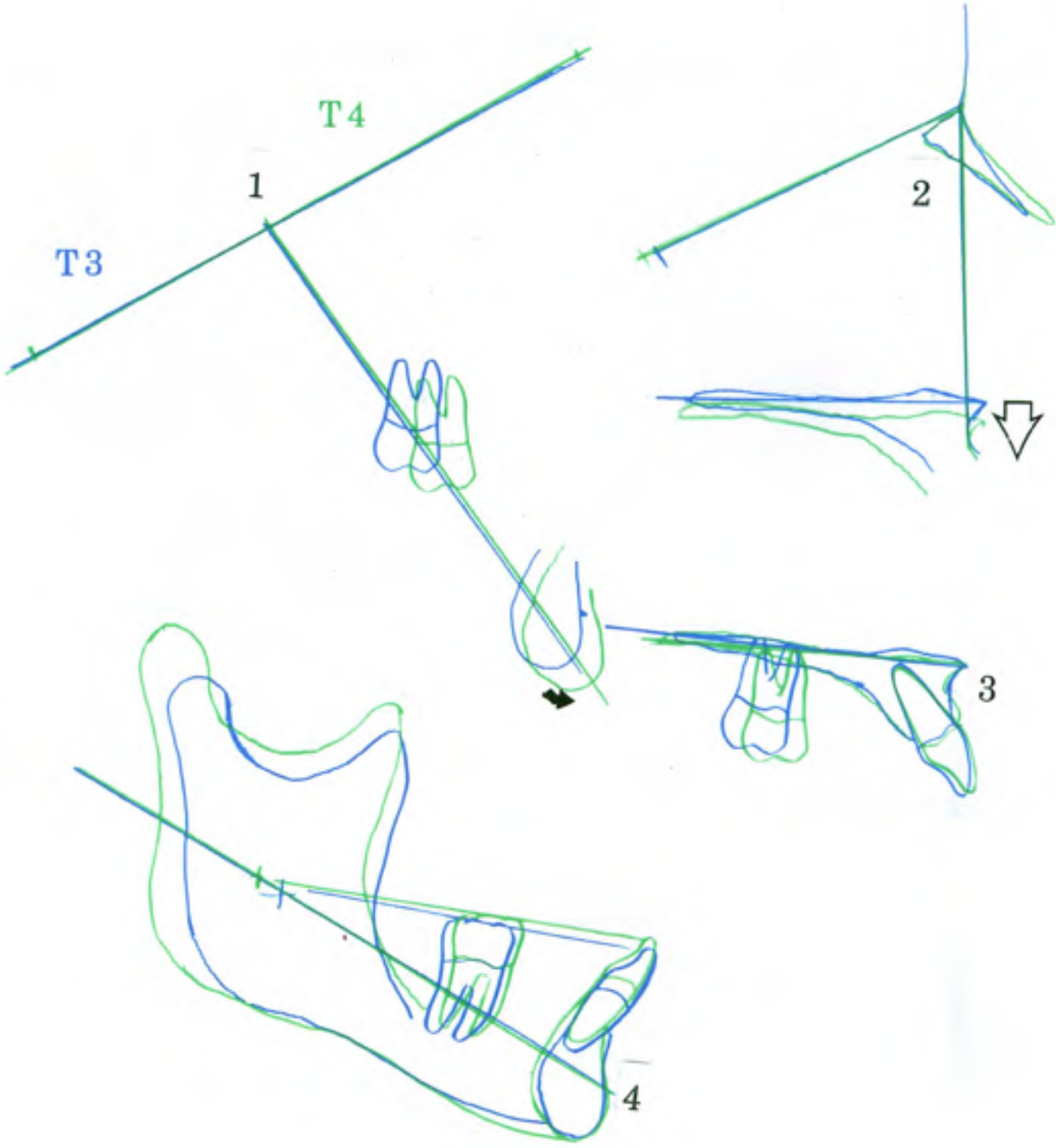
FIG. 10–4-v



The treatment as opposed to natural growth (in 10-4-v).

1. Note the Closing of the Facial Axis.
2. Note the remarkable alteration of the maxilla.
3. The upper incisors were reduced with pressure alone from the face bow.
4. The lower molar moved forward into the "E space".

FIG. 10-4-vi



Comparison of T3 and T4 from age 11 to age 25.

1. Very little growth of the chin.
2. Stabilization of the maxilla.
3. Forward development of the denture (following the mandible).
4. Normal lower arch behavior.

FIG. 10-4-vii

Case #5 G.A.♂ - Class II Continuation

This was a transfer patient seen at age 8,who had previous records at age 6. A severe straight Class II Division 1 was present with a history of injury to the deciduous incisors from a fall. The permanent incisors had Turners hypoplasia which provided a two year non-treated growth experience at the time of the early mixed dentition development. During growth the facial axis and the Maxillary Angle (BaNA) were without change as was seen in Case #4. The incisors had already been chipped from an accident. Short and long range forecasts were made.

Treatment

Cervical traction alone with the face bow was applied at age 8. In twelve months, the maxilla had been reduced. This followed by one year of holding in which the headgear was worn every third night as a retainer. At age eleven, full finishing appliances were applied in order to obtain the therapeutic occlusal relationship. Post treatment monitoring was conducted to age 21. This patient has proven to provoke great interest among students because of the arch form change that occurred with face bow management alone.

Comments

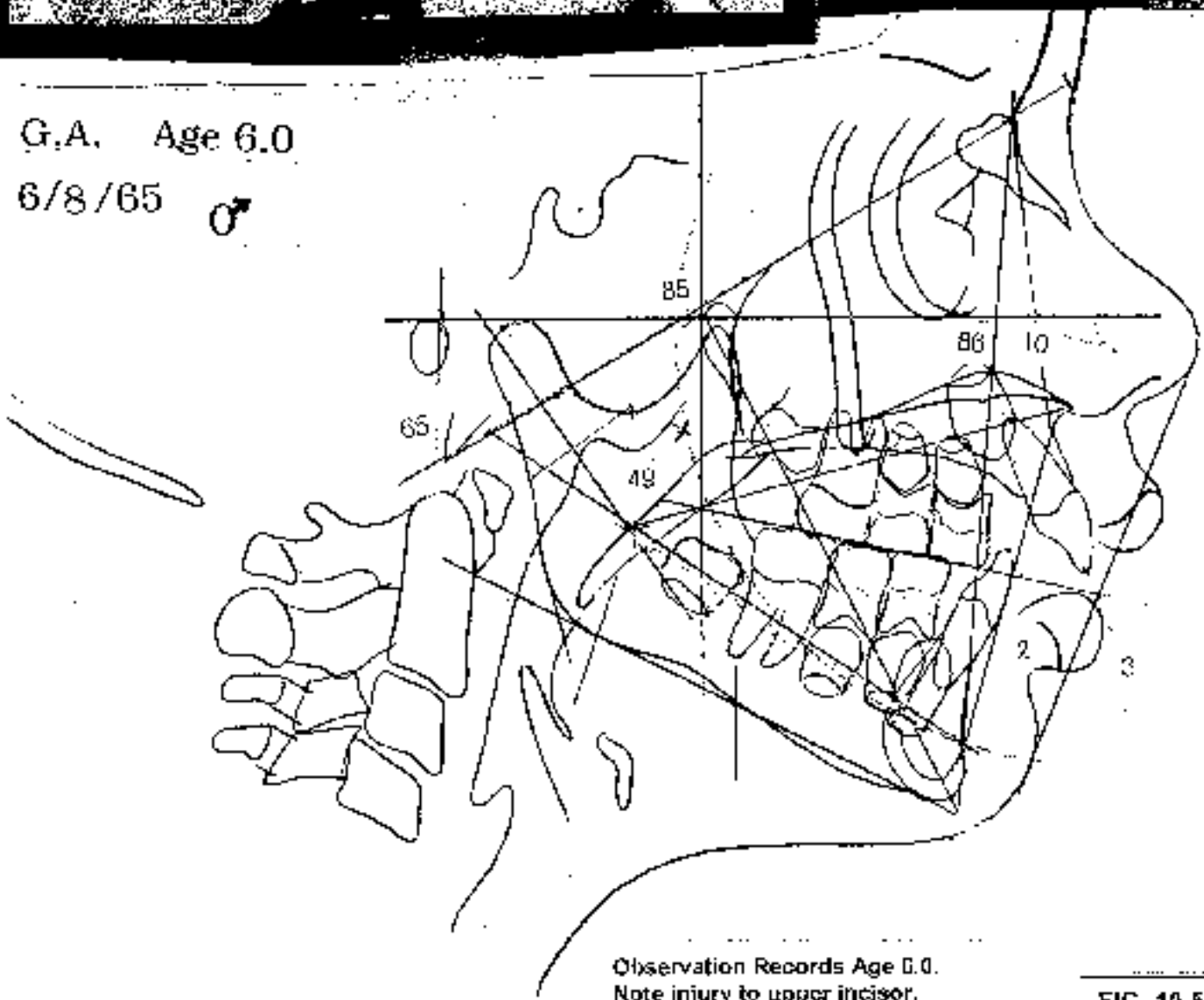
Case #4 and #5 demonstrate the remarkable order of the nasal capsule growth without treatment even with a developing Class II. They further portray the extensive maxillary and perhaps mandibular alteration possible with extra oral therapy.

In the male (G.A.) a notable forward mandibular growth after treatment seemed to redirect the maxilla to a forward course. Typically after maxillary reduction and holding for one year, **the maxilla does not tend to** return. In fact, the permanent reduction may be too much and produce concave profiles in some patients as will be seen later. This is the reason that elastics may be the chosen modality in the patient with a straight profile Class II condition.

The two patients also show long term results which is the final test of a scientific regime.

G.A. Age 6.0

6/8/65 ♂



Observation Records Age 6.0.
Note injury to upper incisor.
Note the microrhino nasal condition.

FIG. 10-5-i

ROCKY MOUNTAIN DATA SYSTEMS INC.
[illegible] VENTURA BLVD. SHERMAN OAKS, CALIFORNIA [illegible]

G[illegible] A[illegible] [illegible] L DR RICKETTS/BENDA
AGE 6.00/ 0.0 YRS 1 0011-73-0010
X-RAY DATE 05/08/69 ANALYST 31 DATE 09/21/73

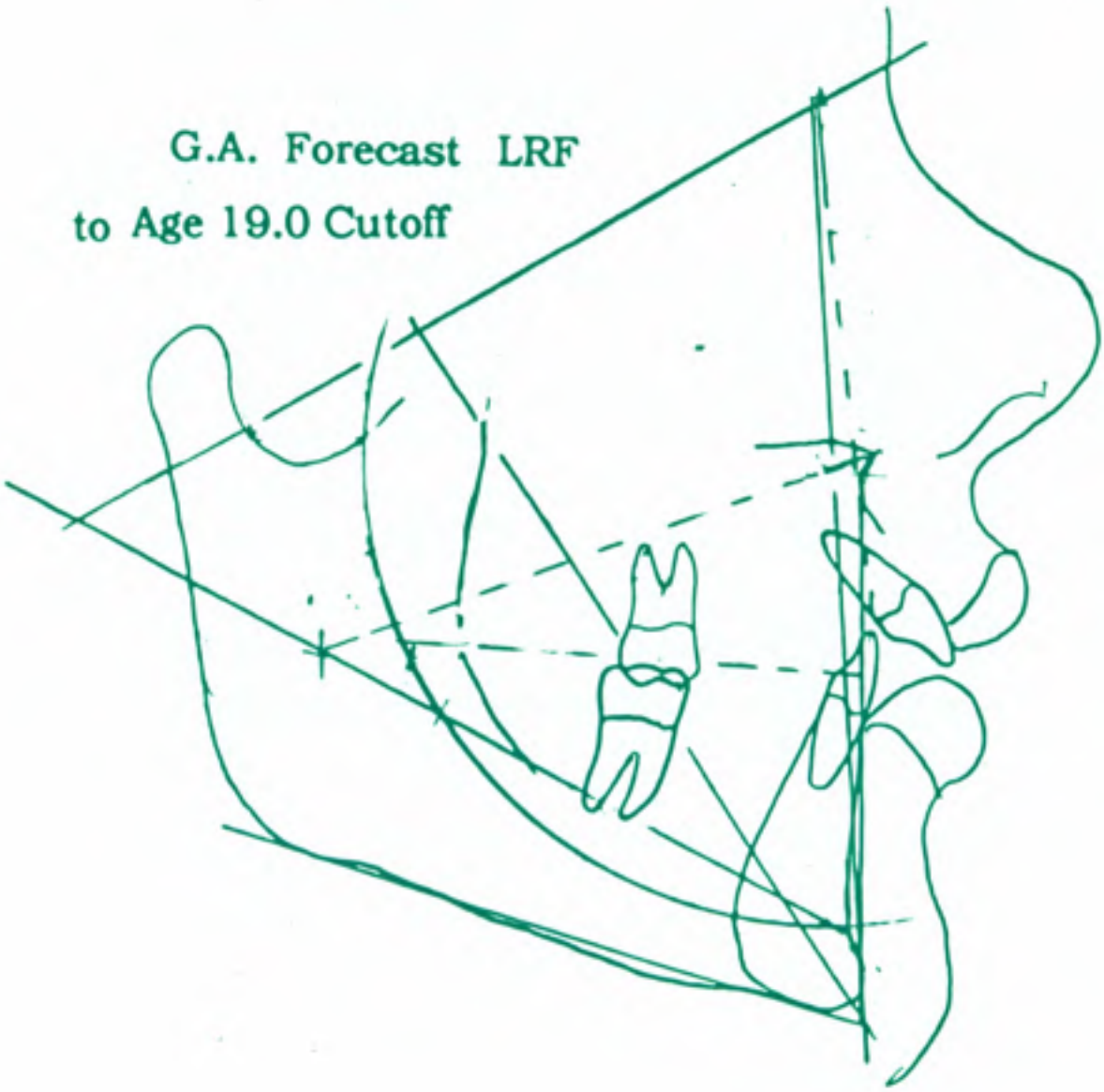
COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
LATERAL BEFORE TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
01-MOLAR RELATION	3.3 MM	-3.0 MM	2.1	**
03-CANINE RELATION	3.6 MM	-2.0 MM	1.9	*
05-INCISOR OVERJET	11.6 MM	2.5 MM	3.6	***
07-INCISOR OVERBITE	2.2 MM	2.5 MM	-0.2	
09-LOWER INCISOR EXTRUSION	2.7 MM	1.3 MM	0.7	
#11-INTERINCISAL ANGLE	126.4 DEG	130.0 DEG	-0.6	
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
#13-CONVEXITY	10.0 MM	0.5 MM	4.7	***
15-LOWER FACIAL HEIGHT	50.0 DEG	47.5 DEG	0.6	
FIELD III DENTURE TO SKELETON				
#18-UPPER MOLAR POSITION	12.0 MM	8.9 MM	1.0	*
#20-MAND INCISOR PROTRUSION	-1.2 MM	1.0 MM	-1.0	
22-MAX INCISOR PROTRUSION	10.6 MM	3.5 MM	3.2	***
24-MAND INCISOR INCLINATION	14.5 DEG	22.0 DEG	-1.9	*
26-MAX INCISOR INCLINATION	39.1 DEG	26.0 DEG	3.3	***
27-OCCLUSAL PLANE-RAMUS(XI)	2.8 MM	2.3 MM	0.2	
28-OCCLUSAL PL INCLINATION	24.5 DEG	21.2 DEG	0.8	
FIELD IV ESTHETIC PROBLEM (LIP RELATION)				
29-LIP PROTRUSION	2.9 MM	-1.5 MM	2.2	**
30-UPPER LIP LENGTH	25.4 MM	22.5 MM	1.5	*
31-LIP EMBRASURE-OCC PL	-2.0 MM	-3.8 MM	0.9	
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
#32-FACIAL DEPTH	84.7 DEG	85.6 DEG	0.4	
#34-FACIAL AXIS	85.4 DEG	89.7 DEG	-1.2	*
35-FACIAL TAPER	67.5 DEG	68.0 DEG	-0.1	
36-MAXILLARY DEPTH	96.5 DEG	90.0 DEG	2.2	**
37-MAXILLARY HEIGHT	50.5 DEG	51.9 DEG	-0.5	
38-PALATAL PLANE (FH)	7.6 DEG	1.0 DEG	1.9	*
#39-MANDIBULAR PLANE (FH)	29.0 DEG	26.5 DEG	0.2	
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
40-CRANIAL DEFLECTION	29.4 DEG	27.0 DEG	0.8	
42-CRANIAL LENGTH ANTERIOR	54.2 MM	50.8 MM	1.4	*
44-POSTERIOR FACIAL HEIGHT	51.2 MM	50.1 MM	0.4	
46-RAMUS POSITION	71.7 DEG	76.0 DEG	-1.4	*
48-PORION LOCATION (TMJ)	-40.3 MM	36.2 MM	-1.9	*
50-MANDIBULAR ARC	20.8 DEG	24.7 DEG	-1.0	
51-CORPUS LENGTH	59.3 MM	59.7 MM	-0.1	

#-DENOTES SUMMARY FACTOR ON TRACING

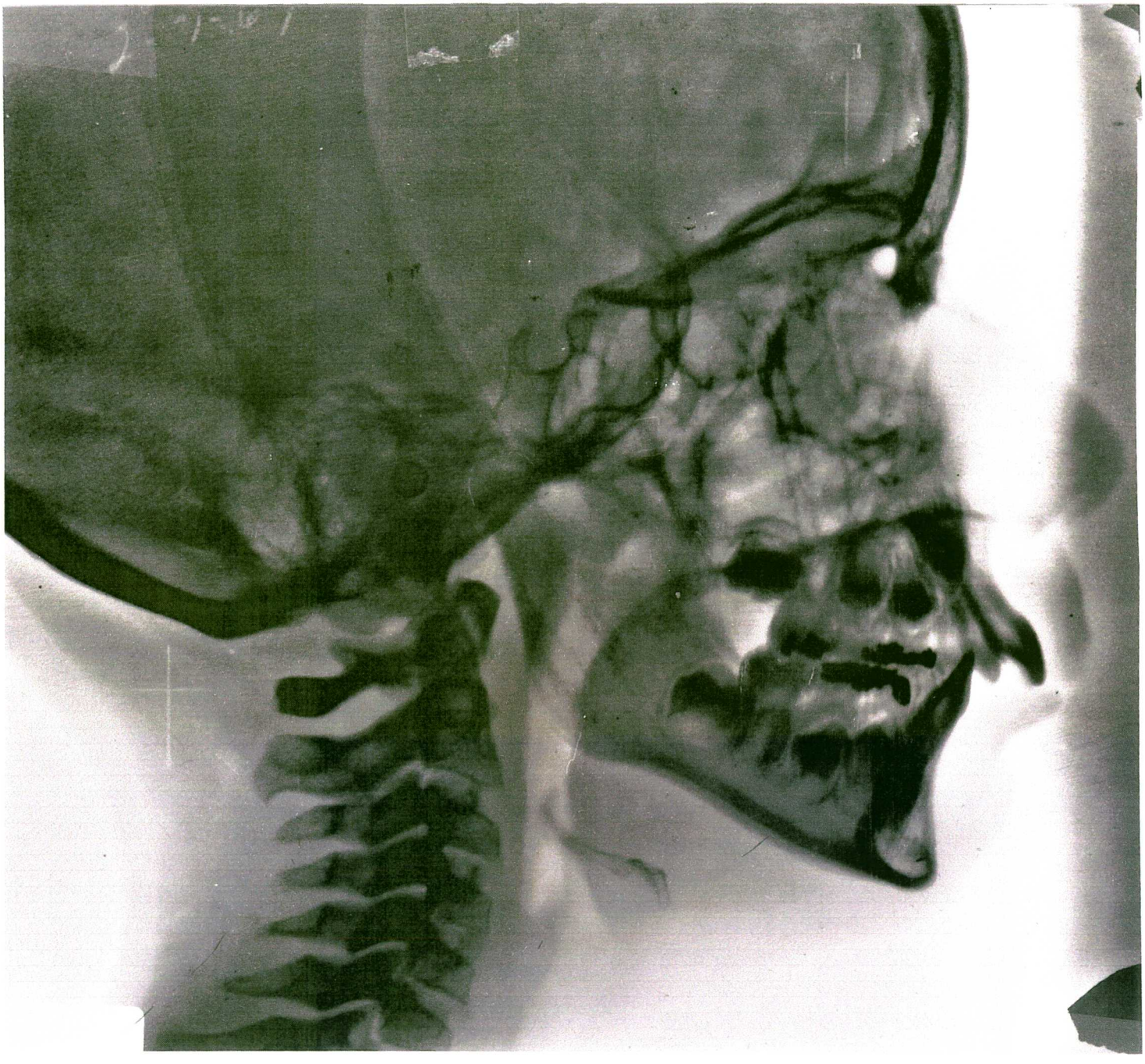
Lateral Printout of G.A.
No Frontal was taken by referring orthodontist

FIG. 10-5-ii



LRF – long range forecast to maturity with no treatment.

FIG. 10-5-iii

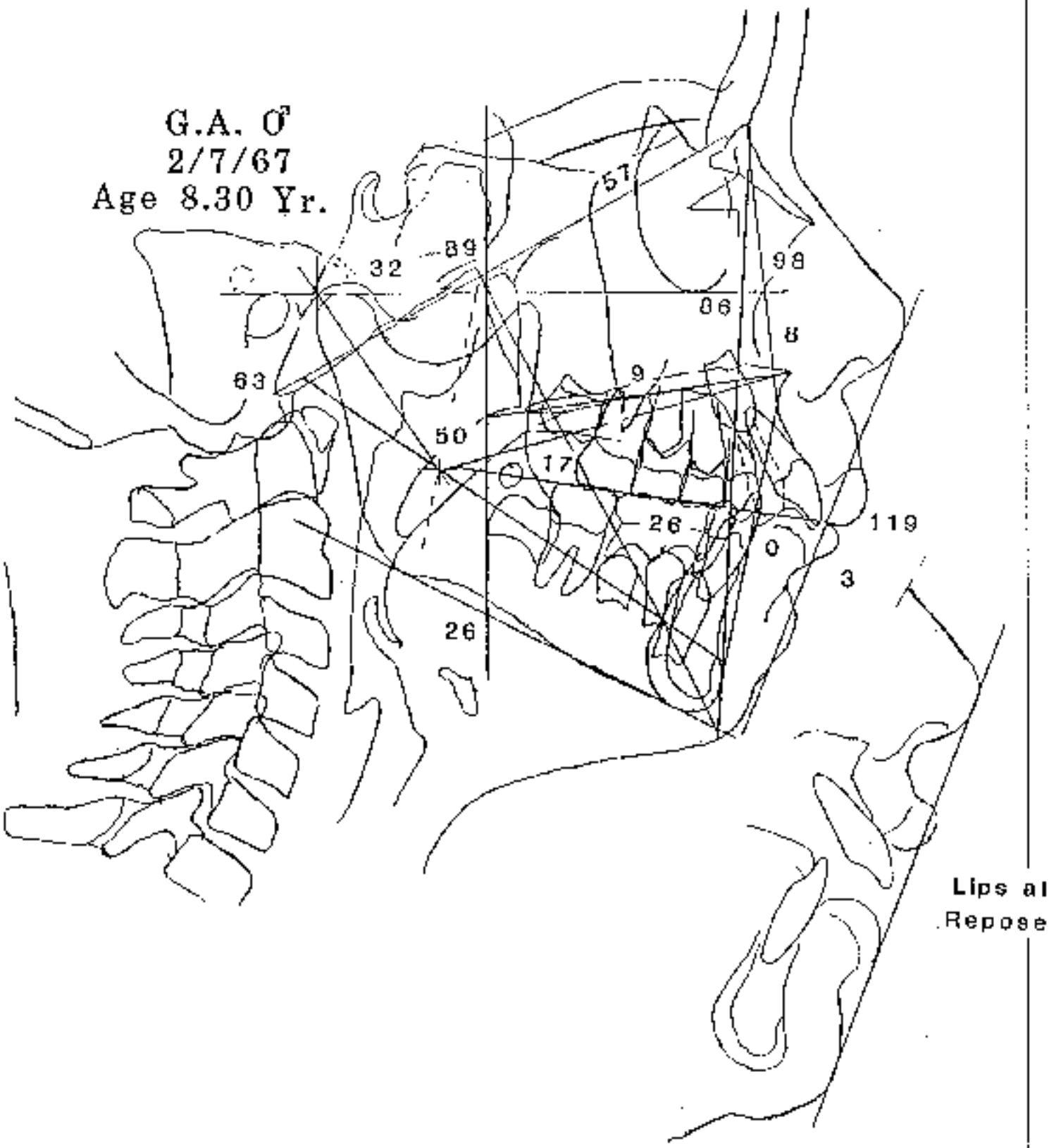


Lateral film at age 8.30 years of the same Patient G.A.

FIG. 10-5-iv

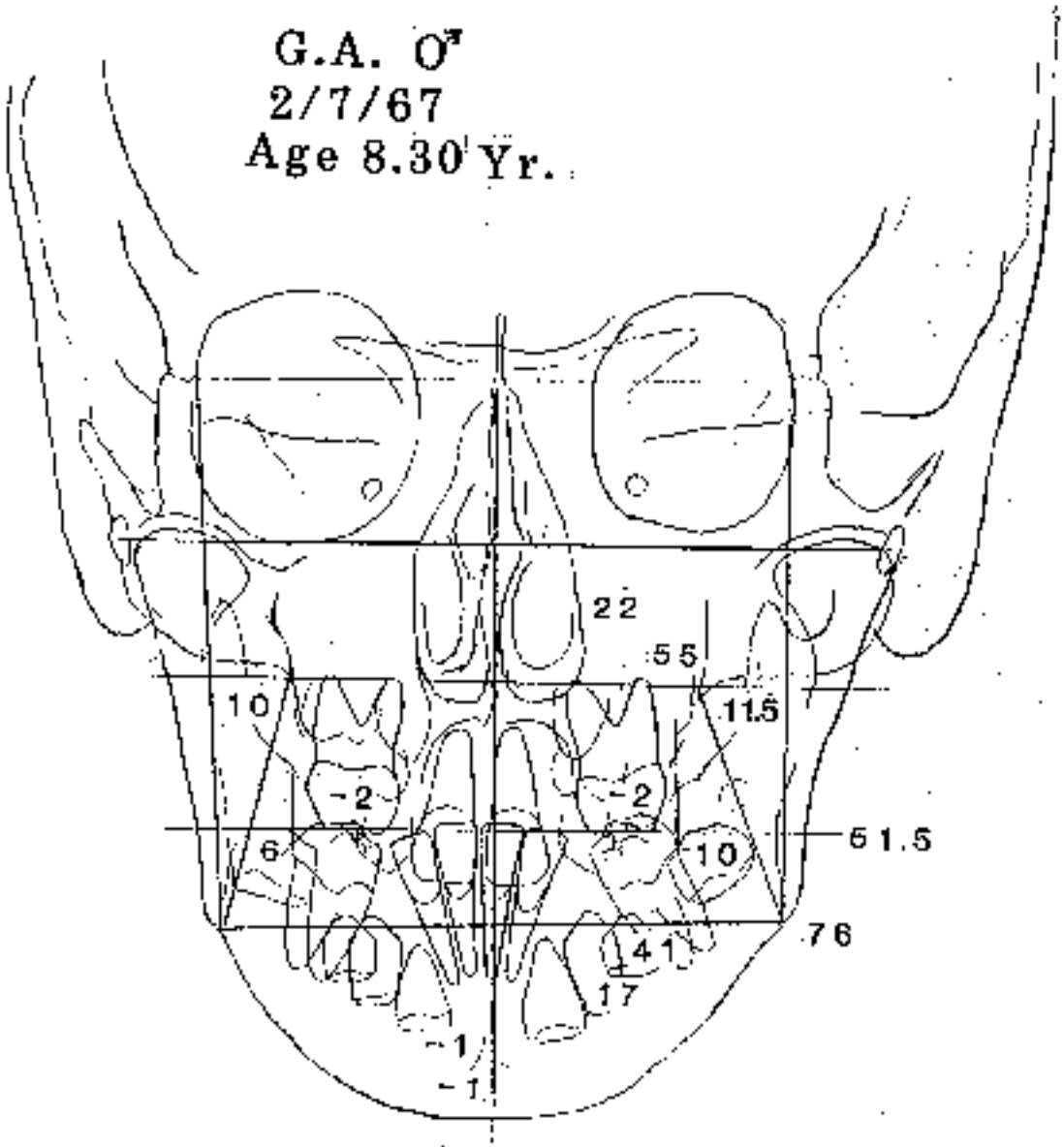
Frontal of G.A. male at age 8.0 years.

FIG. 10-5-v



Lateral tracing and analysis of G.A. at age 8.30.
Note High Convexity and Lip Strain.

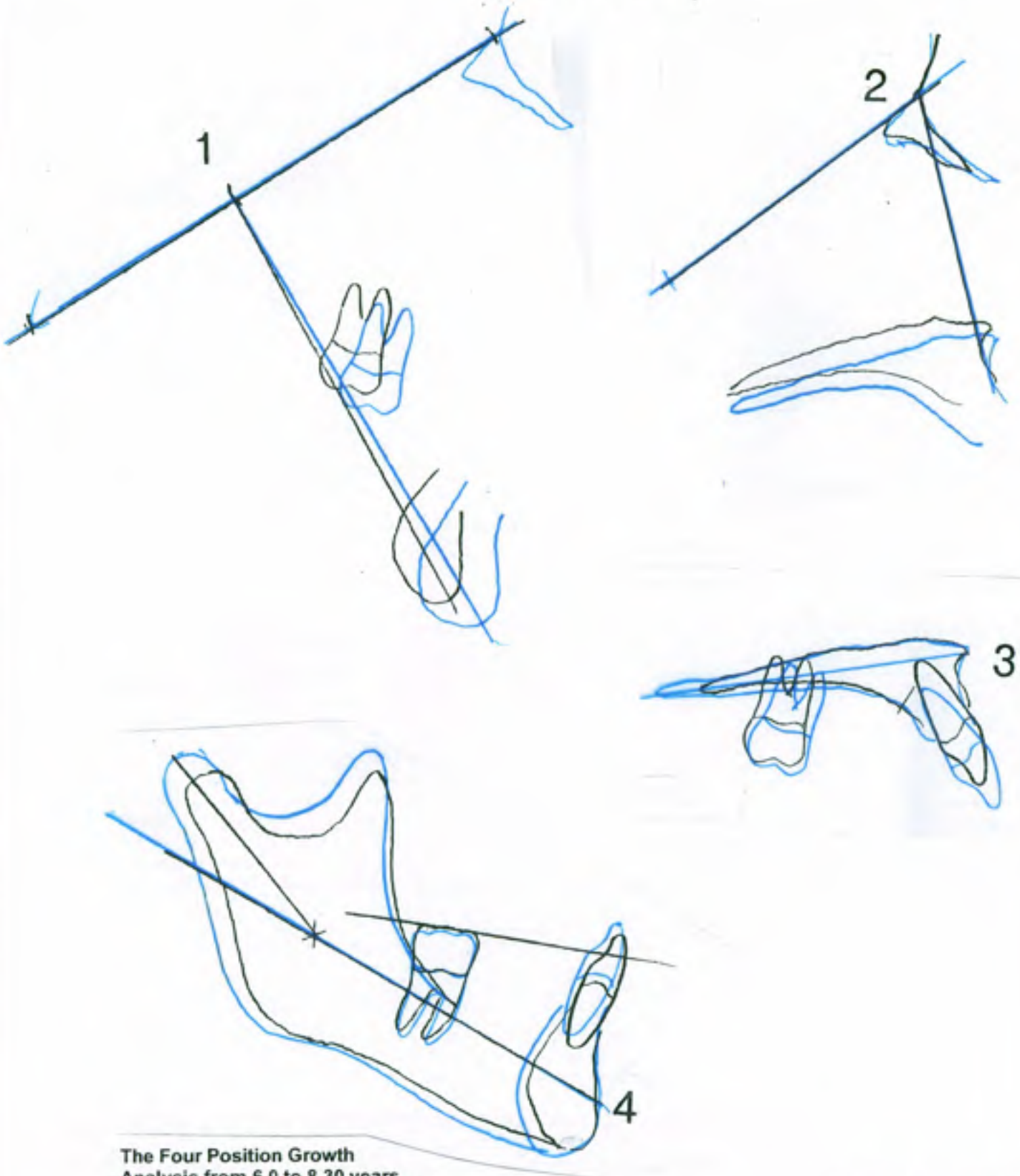
FIG. 10-5-vi



Frontal tracing.
Note Cross-bite Class II, Narrow maxilla and narrow lower arch at molars.

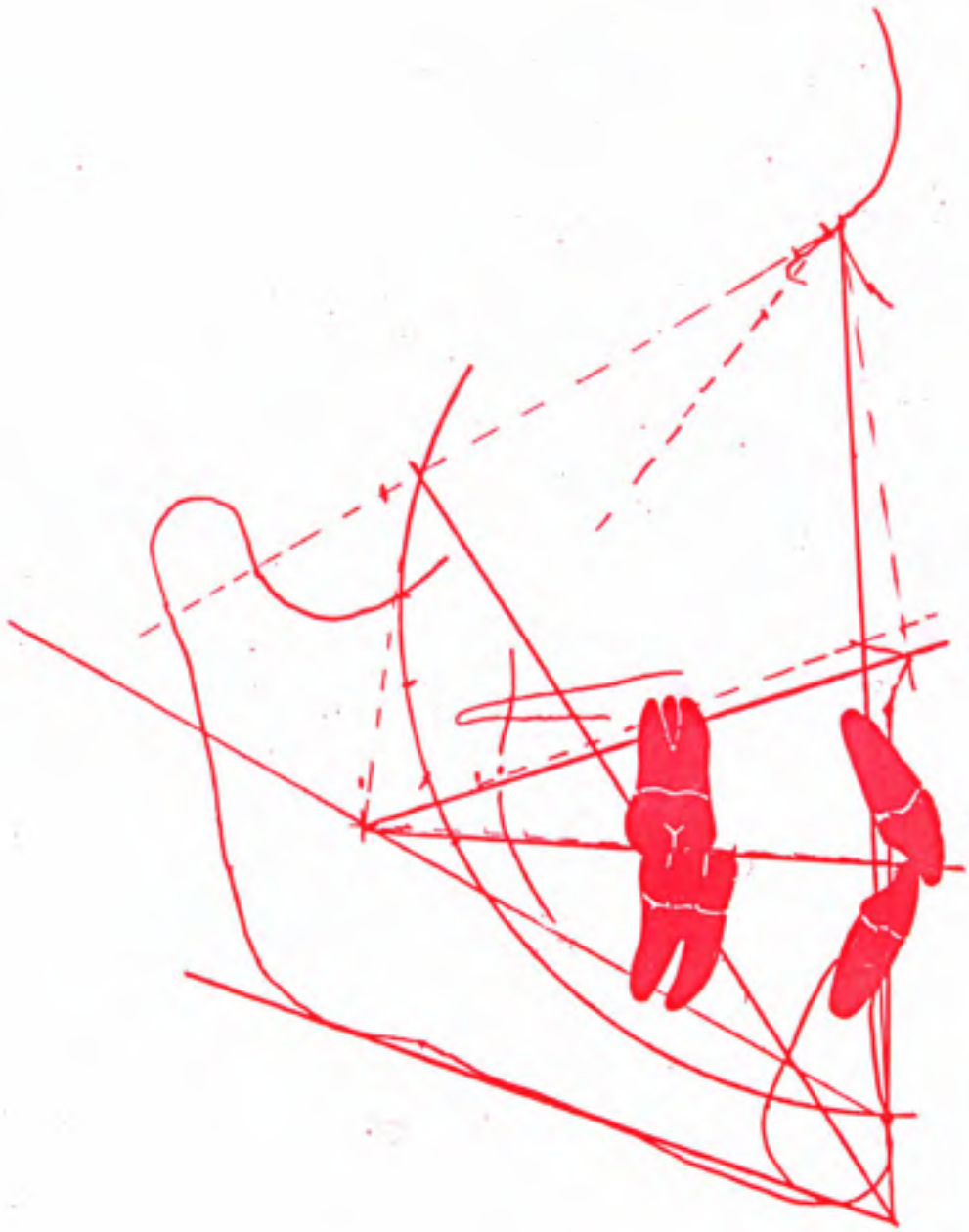
FIG. 10-5-vii

T1 to T2



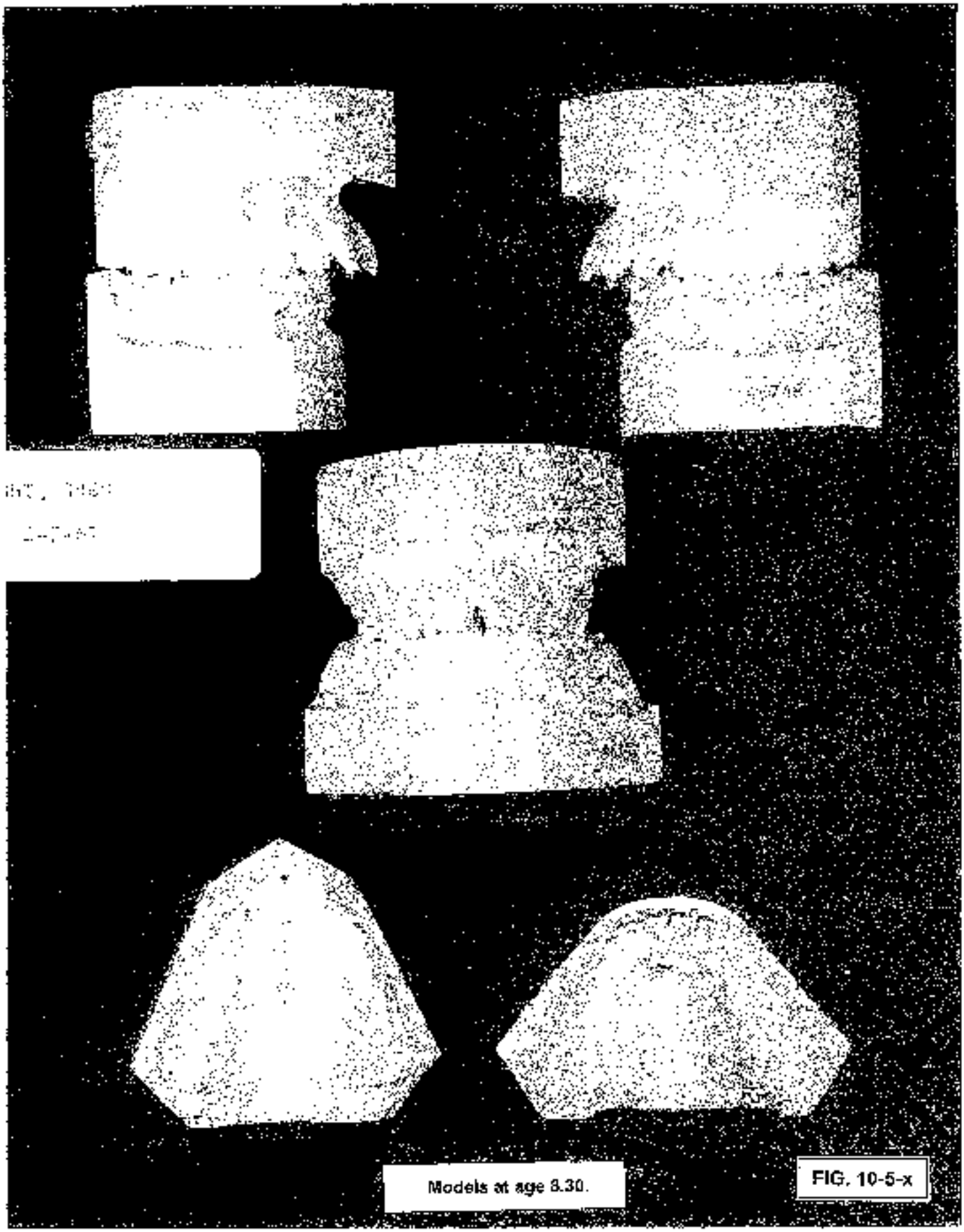
The Four Position Growth
Analysis from 6.0 to 8.30 years.
Note the forward chin development.
No change in the maxilla but increased upper incisor protrusion.

FIG. 10-5-viii



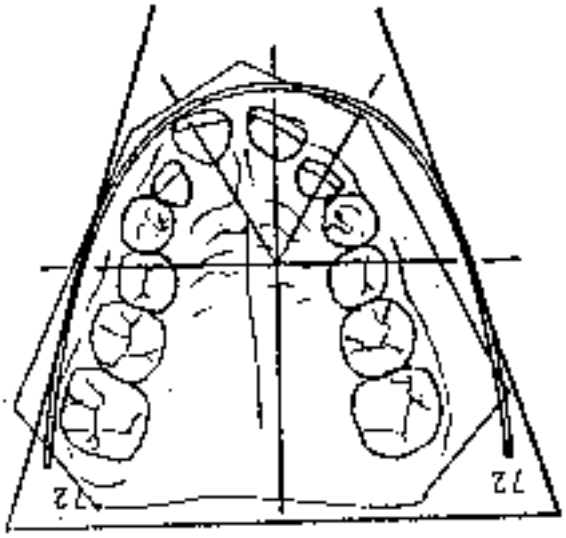
Arcial growth and VTG to age 19.0 years started at age 8.
Compare to LRF (Fig. 10-5-ii) started at age 6.

FIG. 10-5-ix

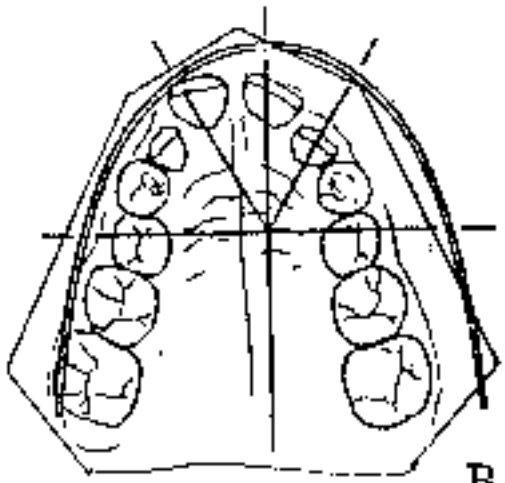


Models at age 8.30.

FIG. 10-5-x

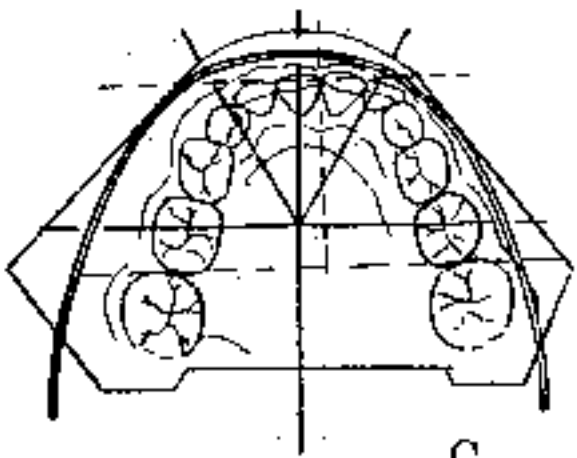


NORMAL A



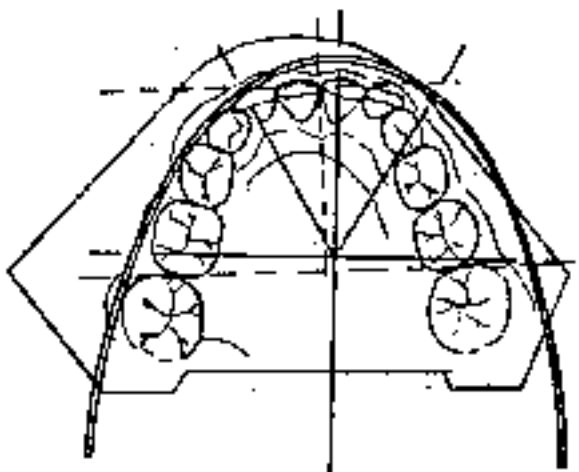
B

NARROW TAPERED



C

OVOID



TAPERED D

Traced models with superimposed types of arches. Patient was treated to the Normal(A). Note lower compared to the ovoid (C). No tapered form fit the original (B or D). See Fig. 10-5-xix for arch dimensions before and after.

FIG. 10-5-xi

ROCKY MOUNTAIN DATA SYSTEMS INC.

[illegible]

COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
LATERAL – BEFORE TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I – THE DENTURE PROBLEM (OCCLUSAL RELATION)				
01-MOLAR RELATION	3.0 MM	-4.0 MM	1.9	**
02-CANINE RELATION	4.6 MM	-3.6 MM	2.2	**
03-INCISOR OVERJET	12.1 MM	2.5 MM	3.6	***
04-INCISOR OVERBITE	3.5 MM	2.5 MM	0.7	
05-LOWER INCISOR EXTRUSION	3.4 MM	1.3 MM	2.2	**
#11-INTERINCISAL ANGLE	124.2 DEG	130.0 DEG	-1.6	*
FIELD II – THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
#13-CONVEXITY	8.2 MM	2.1 MM	2.9	**
15-LOWER FACIAL HEIGHT	44.1 DEG	47.0 DEG	0.2	
FIELD III – DENTURE TO SKELETON				
#16-UPPER MOLAR POSITION	15.0 MM	13.3 MM	1.2	*
#20-MAND INCISOR PROTRUSION	-0.7 MM	1.0 MM	0.4	
22-MAX INCISOR PROTRUSION	12.0 MM	3.5 MM	3.9	***
24-MAND INCISOR INCLINATION	17.0 DEG	22.0 DEG	-0.9	
26-MAX INCISOR INCLINATION	43.8 DEG	26.1 DEG	4.5	***
27-OCCLUSAL PLANE-RAMUS(XI)	2.6 MM	1.2 MM	0.5	
28-OCCLUSAL PL INCLINATION	27.9 DEG	22.5 DEG	0.7	
FIELD IV – ESTHETIC PROBLEM (LIP RELATION)				
29-LIP PROTRUSION	3.2 MM	2.2 MM	1.6	*
30-UPPER LIP LENGTH	28.5 MM	23.5 MM	2.6	**
31-LIP EMBRASURE-OCC PL	-2.6 MM	-3.2 MM	0.1	
FIELD V – THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
#32-FACIAL DEPTH	85.9 DEG	86.4 DEG	-0.1	
#33-FACIAL AXIS	80.4 DEG	90.0 DEG	-3.2	
35-FACIAL TAPER	67.2 DEG	68.0 DEG	0.3	
36-MAXILLARY DEPTH	94.9 DEG	90.7 DEG	1.4	*
37-MAXILLARY HEIGHT	55.5 DEG	53.5 DEG	-0.2	
38-PALATAL PLANE (FH)	4.4 DEG	1.0 DEG	1.7	*
#39-MANDIBULAR PLANE (FH)	24.5 DEG	23.7 DEG	0.1	
FIELD VI – THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
40-CRANIAL DEFLECTION	28.2 DEG	27.0 DEG	0.4	
42-CRANIAL LENGTH ANTERIOR	55.2 MM	53.4 MM	0.9	
44-POSTERIOR FACIAL HEIGHT	61.7 MM	62.5 MM	-0.2	
45-RAMUS POSITION	75.1 DEG	76.0 DEG	-0.3	
46-PORION LOCATION (IND.)	-42.0 MM	-38.2 MM	-2.5	*
50-MANDIBULAR ARC	25.2 DEG	26.8 DEG	-0.4	
51-CORPUS LENGTH	63.0 MM	62.5 MM	0.2	

# DENOTES SUMMARY FACTOR ON TRACING

ROCKY MOUNTAIN DATA SYSTEMS INC.

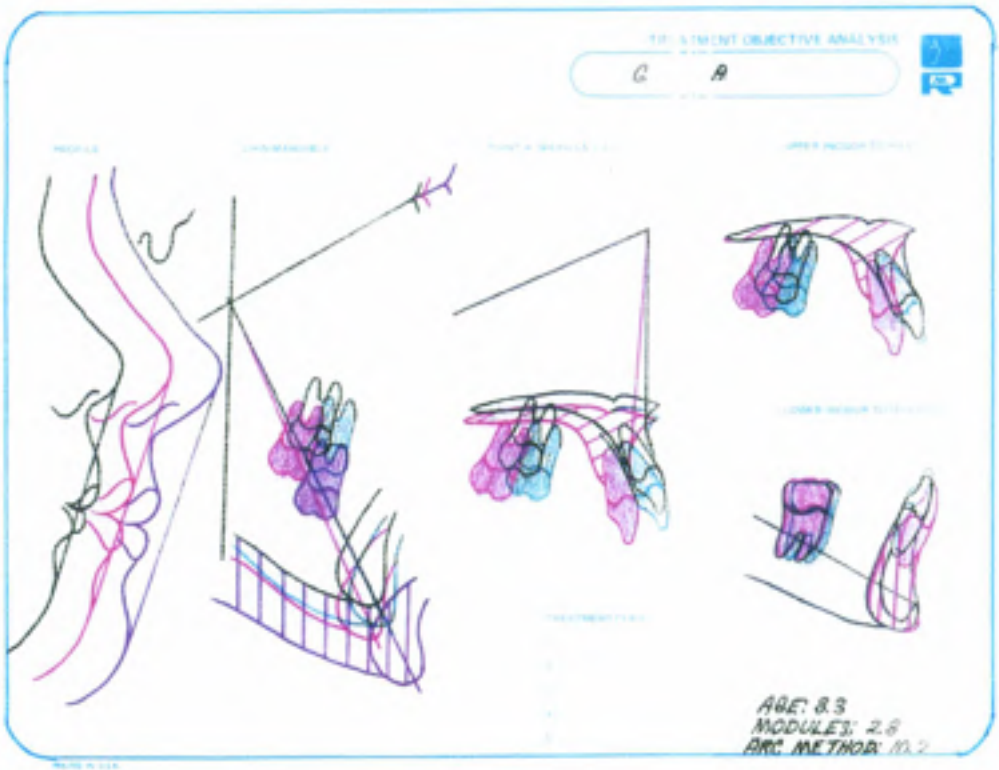
[illegible]

COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
FRONTAL – BEFORE TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I – THE DENTURE PROBLEM (OCCLUSAL RELATION)				
53-MOLAR RELATION LEFT	-0.1 MM	1.5 MM	-1.1	*
54-MOLAR RELATION RIGHT	-1.2 MM	1.5 MM	-1.2	*
#56-INTERMOLAR WIDTH (MAND.)	51.9 MM	55.0 MM	-1.3	*
58-INTERCANINE WIDTH (MAND.)	16.7 MM	25.7 MM	-2.3	**
#61-DENTURE MIDLINE	0.5 MM	0.0 MM	0.3	
FIELD II – THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
#64-MAX-MAND WIDTH LEFT	-13.2 MM	-10.3 MM	-1.3	*
#65-MAX-MAND WIDTH RIGHT	-12.2 MM	-8.3 MM	-2.5	**
67-MAX-MAND MIDLINE	[illegible] DEG	0.0 DEG	[illegible]	
FIELD III – DENTURE TO SKELETON				
69-MOLAR TO JAW LEFT (MAND.)	5.2 MM	5.6 MM	-0.2	
71-MOLAR TO JAW RIGHT (MAND.)	7.4 MM	5.6 MM	1.4	*
73-DENTAL-JAW MIDLINES	-1.0 MM	0.0 MM	-0.1	
75-OCCLUSAL PLANE TILT	1.4 MM	0.0 MM	0.7	
FIELD V – THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
#78-POSTURAL SYMMETRY	-2.9 DEG	0.0 DEG	-1.3	*
FIELD VI – THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
81-NASAL WIDTH	20.5 MM	24.8 MM	-1.2	*
83-NASAL HEIGHT	41.2 MM	42.1 MM	-0.4	
85-MAXILLARY WIDTH	57.7 MM	60.8 MM	-1.5	*
87-MANDIBULAR WIDTH	74.3 MM	73.5 MM	0.3	
89-FACIAL WIDTH	109.0 MM	111.3 MM	-0.7	

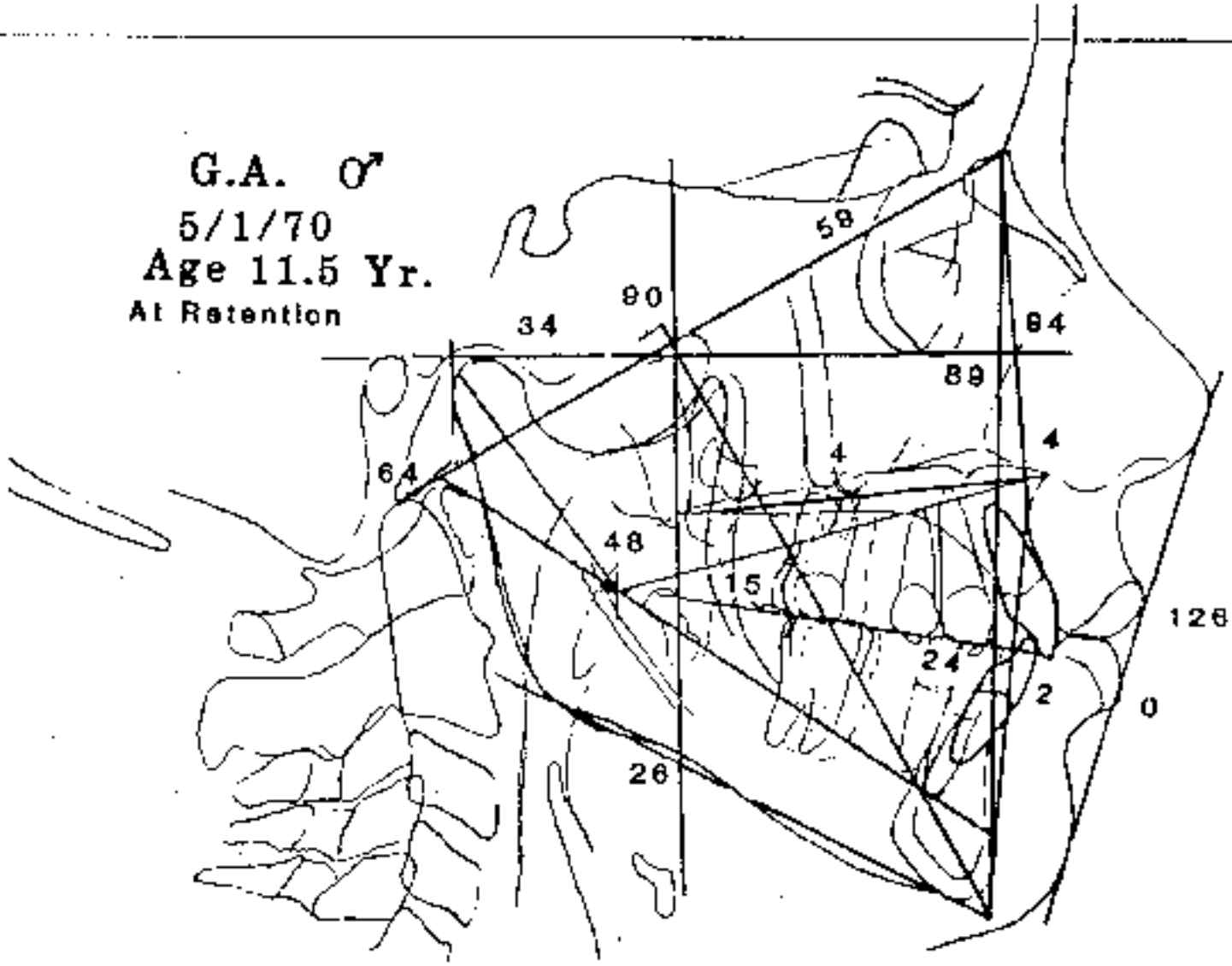
Printout of Lateral and Frontal with asterisks to indicate extent of dysplasia (0 to 3) with Z scores.

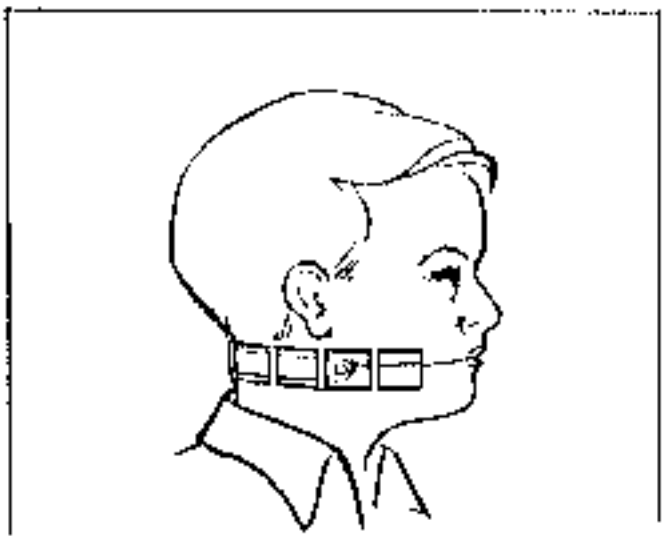
FIG. 10-5-xii

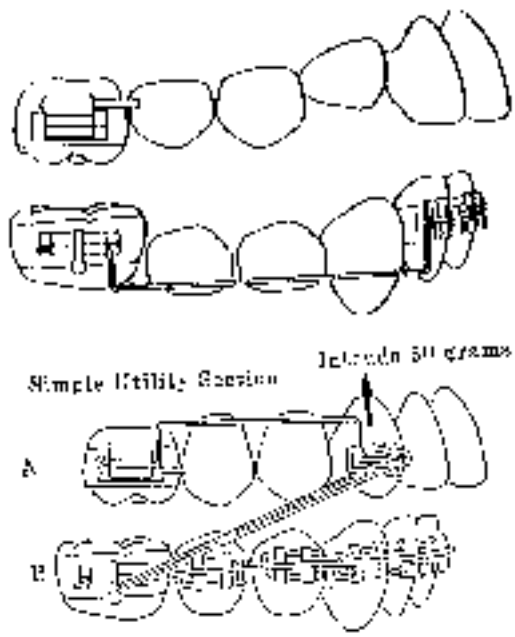


G.A. Analysis of Forecasts (VTO and VTG) with indication of mechanical requirements.

FIG. 10-5-xiii

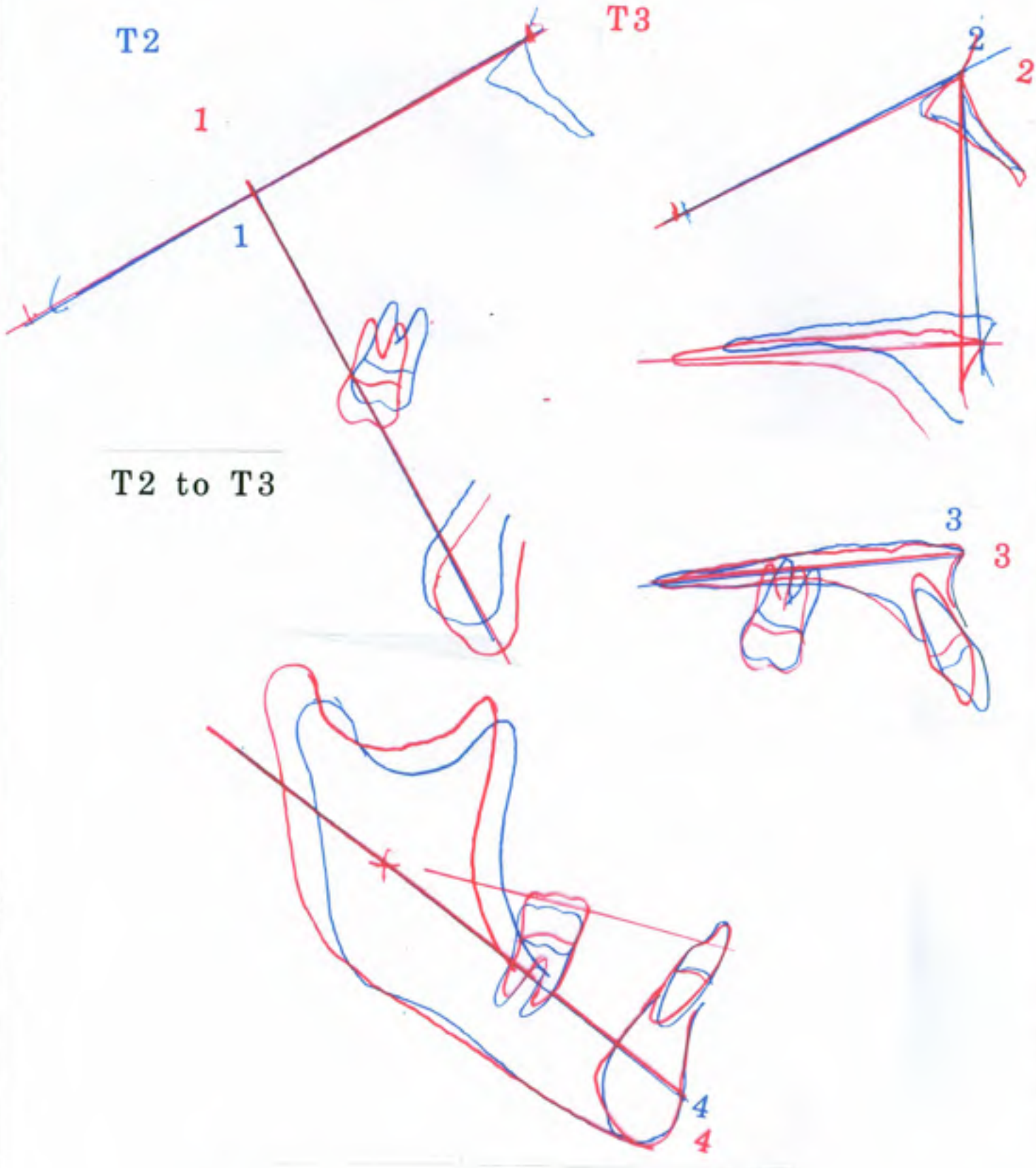






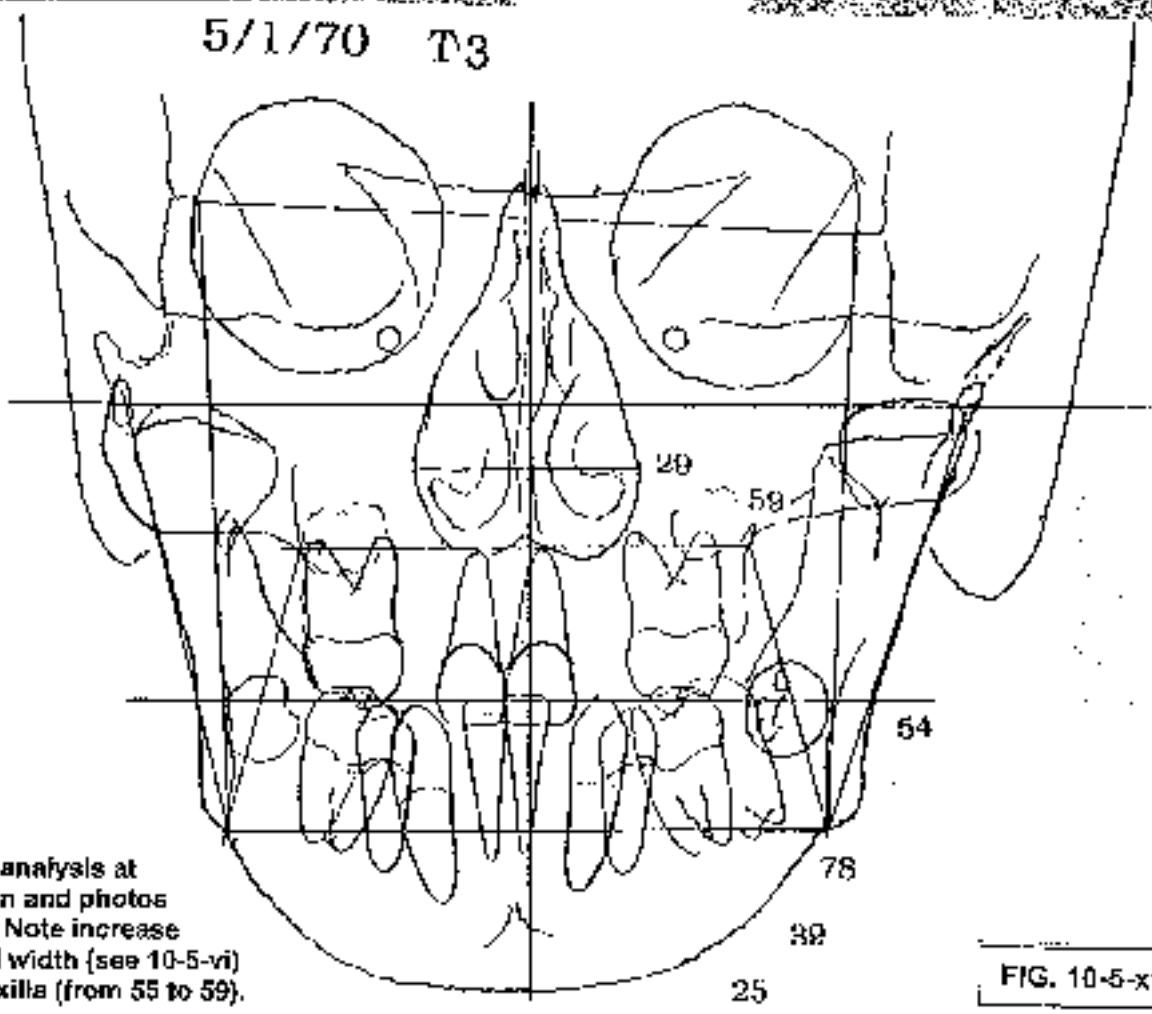
Tracing of G.A. at retention – Treatment sequence was:
Headgear A, Utility B, sectorial mechanics and straight arches.

FIG. 10-5-xiv



Four Position Analysis of changes with growth and treatment.
Notice distal movement of molar orthopedics in the maxilla
and reduction of upper incisor.

FIG. 10-5-xv



Frontal analysis at retention and photos of G.A. Note increase in nasal width (see 10-5-vi) and maxilla (from 55 to 59).

FIG. 10-5-xvi

ROCKY MOUNTAIN DATA SYSTEMS INC.

[redacted] A DR RICKETTS
AGE 11.98/ 0.0 YRS I 0011-73-0010
X-RAY DATE 05/01/70 ANALYST 2A DATE 03/30/73

COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
LATERAL RETENTION

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
#1-MOLAR RELATION	-2.2 MM	-1.0 MM	0.1	
03-CANINE RELATION	-1.7 MM	-2.0 MM	0.1	
05-INCISOR OVERJET	2.8 MM	2.5 MM	0.1	
07-INCISOR OVERBITE	3.0 MM	2.5 MM	0.2	
09-LOWER INCISOR INTRUSION	1.5 MM	1.3 MM	0.1	
#11-INTERINCISAL ANGLE	120.7 DEG	130.0 DEG	-1.8	*
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
#13-CONVEXITY	5.6 MM	1.4 MM	2.1	**
14-LOWER FACIAL HEIGHT	50.4 DEG	46.4 DEG	1.0	*
FIELD III DENTURE TO SKELETON				
#15-UPPER MOLAR POSITION	16.3 MM	14.4 MM	0.7	
#20-MAND INCISOR PROTRUSION	3.3 MM	1.0 MM	1.0	*
22-MAX INCISOR PROTRUSION	8.0 MM	7.5 MM	1.1	*
24-MAND INCISOR INCLINATION	31.3 DEG	22.0 DEG	2.3	**
26-MAX INCISOR INCLINATION	27.9 DEG	26.0 DEG	0.5	
27-OCCLUSAL PLANE-RAMUS(S)	-1.1 MM	-0.5 MM	-0.2	
28-OCCLUSAL PL INCLINATION	28.2 DEG	24.0 DEG	1.1	*
FIELD IV ESTHETIC PROBLEM (LIP RELATION)				
29-LIP PROTRUSION	0.8 MM	-2.6 MM	1.7	*
30-UPPER LIP LENGTH	26.4 MM	24.9 MM	0.7	
31-LIP EMBRASURE-OCC PL	-3.7 MM	-3.2 MM	-0.2	
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
#32-FACIAL DEPTH	90.1 DEG	87.9 DEG	2.8	
#34-FACIAL AXIS	87.4 DEG	90.3 DEG	-0.8	
35-FACIAL TAPER	68.0 DEG	68.0 DEG	-0.9	
36-MAXILLARY DEPTH	95.7 DEG	90.0 DEG	1.8	*
37-MAXILLARY HEIGHT	57.5 DEG	54.2 DEG	1.1	*
38-PALATAL PLANE (FH)	7.3 DEG	1.0 DEG	1.8	*
#39-MANDIBULAR PLANE (FH)	24.9 DEG	25.2 DEG	-0.1	
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
40-CRANIAL DEFLECTION	31.7 DEG	27.0 DEG	1.6	*
42-CRANIAL LENGTH ANTERIOR	57.8 MM	47.5 MM	3.1	
44-POSTERIOR FACIAL HEIGHT	56.6 MM	57.8 MM	-0.4	
46-RAMUS POSITION	74.9 DEG	76.0 DEG	-0.4	
48-PORION LOCATION (TMJ)	-45.8 MM	-40.1 MM	-2.6	**
50-MANDIBULAR ARC	16.3 DEG	27.9 DEG	-2.8	**
51-CORPUS LENGTH	72.5 MM	68.4 MM	1.6	*

ROCKY MOUNTAIN DATA SYSTEMS INC.

[redacted] A DR RICKETTS
AGE 11.98/ 0.0 YRS I 0011-73-0010
X-RAY DATE 05/01/70 ANALYST 2A DATE 03/30/73

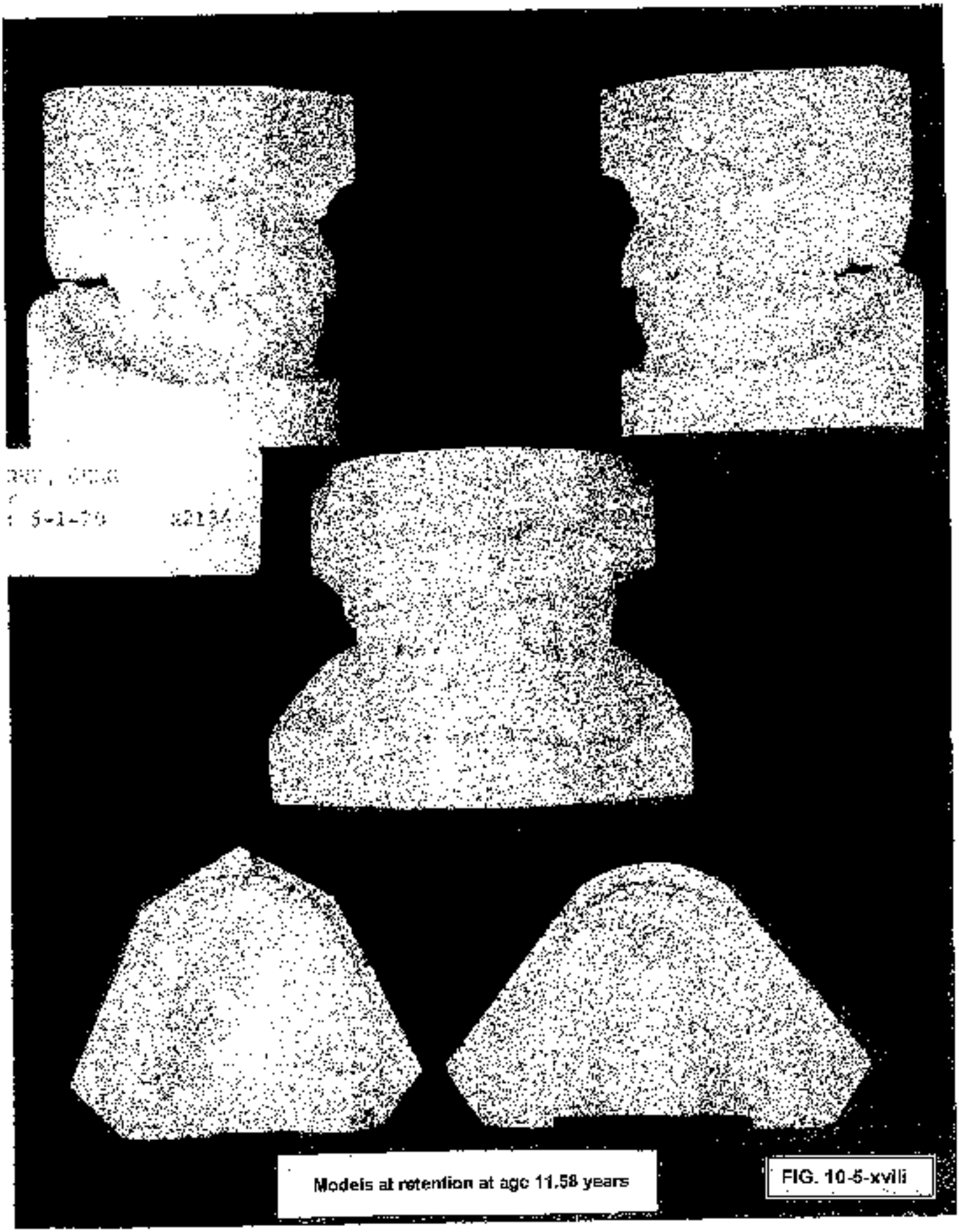
COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
FRONTAL RETENTION

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
02-MOLAR RELATION LEFT	-0.8 MM	1.5 MM	-1.6	*
04-MOLAR RELATION RIGHT	0.0 MM	1.5 MM	-1.0	
#06-INTERMOLAR WIDTH (MAND)	54.7 MM	55.0 MM	-0.2	
08-INTERCANINE WIDTH (MAND)	23.2 MM	26.4 MM	-1.4	*
#10-DENTURE MIDLINE	0.2 MM	0.0 MM	0.1	
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
#14-MAX-MAND WIDTH LEFT	-11.7 MM	-10.9 MM	-0.5	
#16-MAX-MAND WIDTH RIGHT	-12.0 MM	-10.9 MM	-0.7	
17-MAX-MAND MIDLINE	0.3 DEG	0.0 DEG	0.2	
FIELD III DENTURE TO SKELETON				
19-MOLAR TO JAW LEFT (MAND)	6.4 MM	7.9 MM	-2.0	**
21-MOLAR TO JAW RIGHT(MAND)	7.5 MM	7.9 MM	-0.3	
23-DENTURE-JAW MIDLINES	-2.6 MM	0.0 MM	-1.7	*
25-OCCLUSAL PLANE TILT	2.3 MM	0.0 MM	1.1	*
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
33-POSTURAL SYMMETRY	-3.2 DEG	0.0 DEG	-1.6	*
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
41-NASAL WIDTH	27.7 MM	26.9 MM	0.4	
43-NASAL PROPORTION	59.4 DEG	59.4 DEG	-0.0	
45-MAXILLA PROPORTION	101.2 DEG	102.3 DEG	-0.2	
47-MANDIBLE PROPORTION	84.7 DEG	87.3 DEG	-0.7	
49-FACIAL PROPORTION	95.1 DEG	96.9 DEG	-0.6	

# DENOTES SUMMARY FACTOR ON TRACING

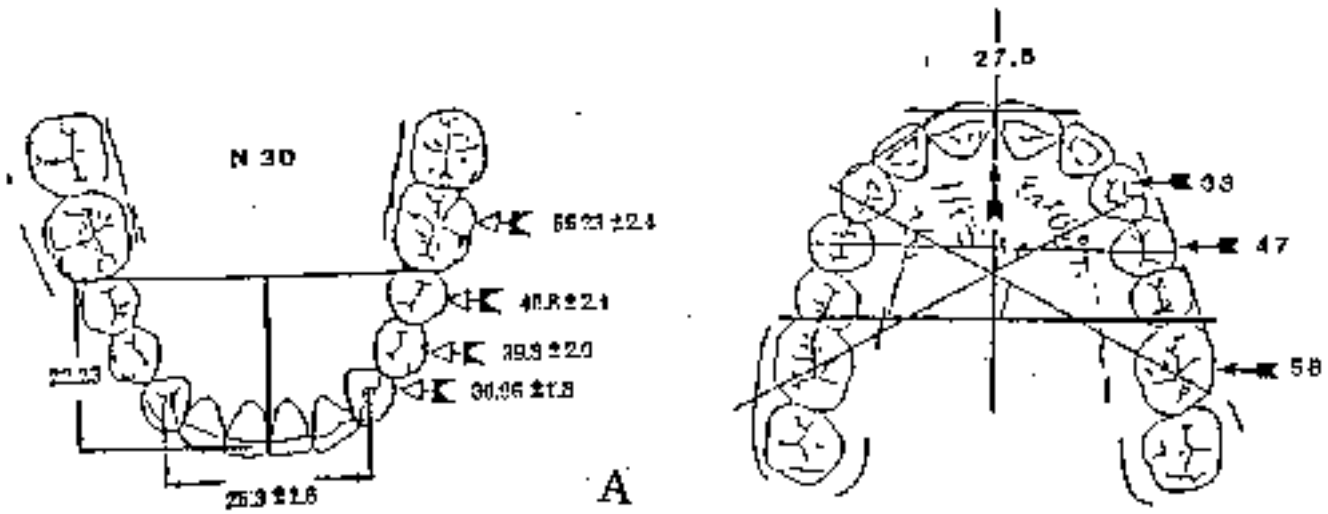
Printout at end of treatment.
Notice denture stars are eliminated.

FIG. 10-5-xvii



Models at retention at age 11.58 years

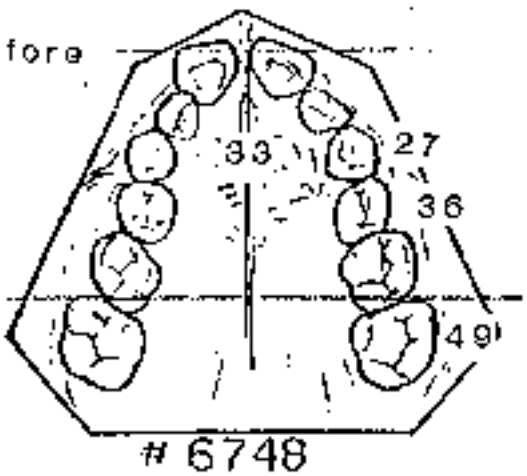
FIG. 10-5-xviii



NORMAL DIMENSIONS

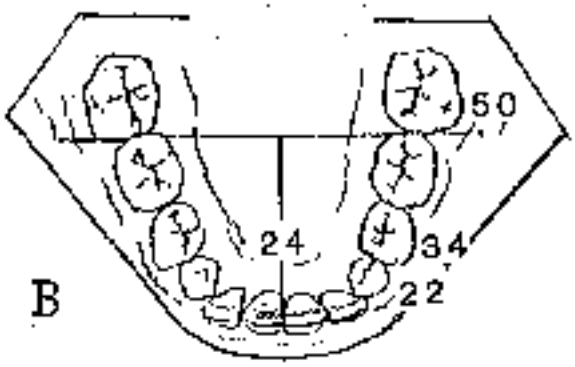
G.A. ♂

Before



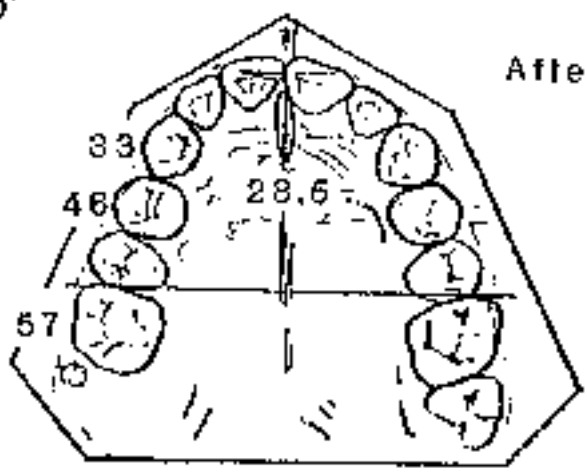
6748

Age 8-4

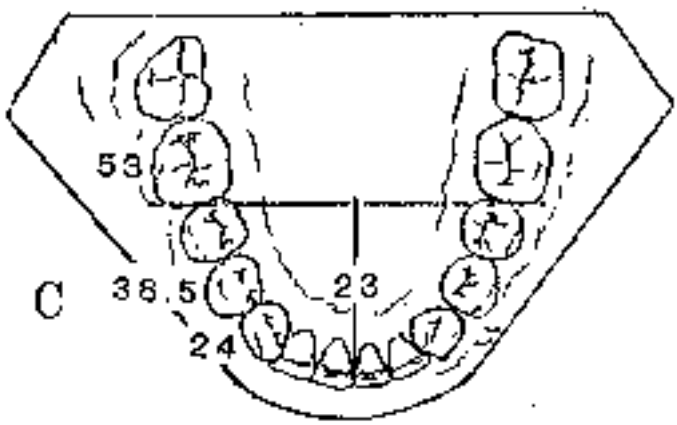


B

After



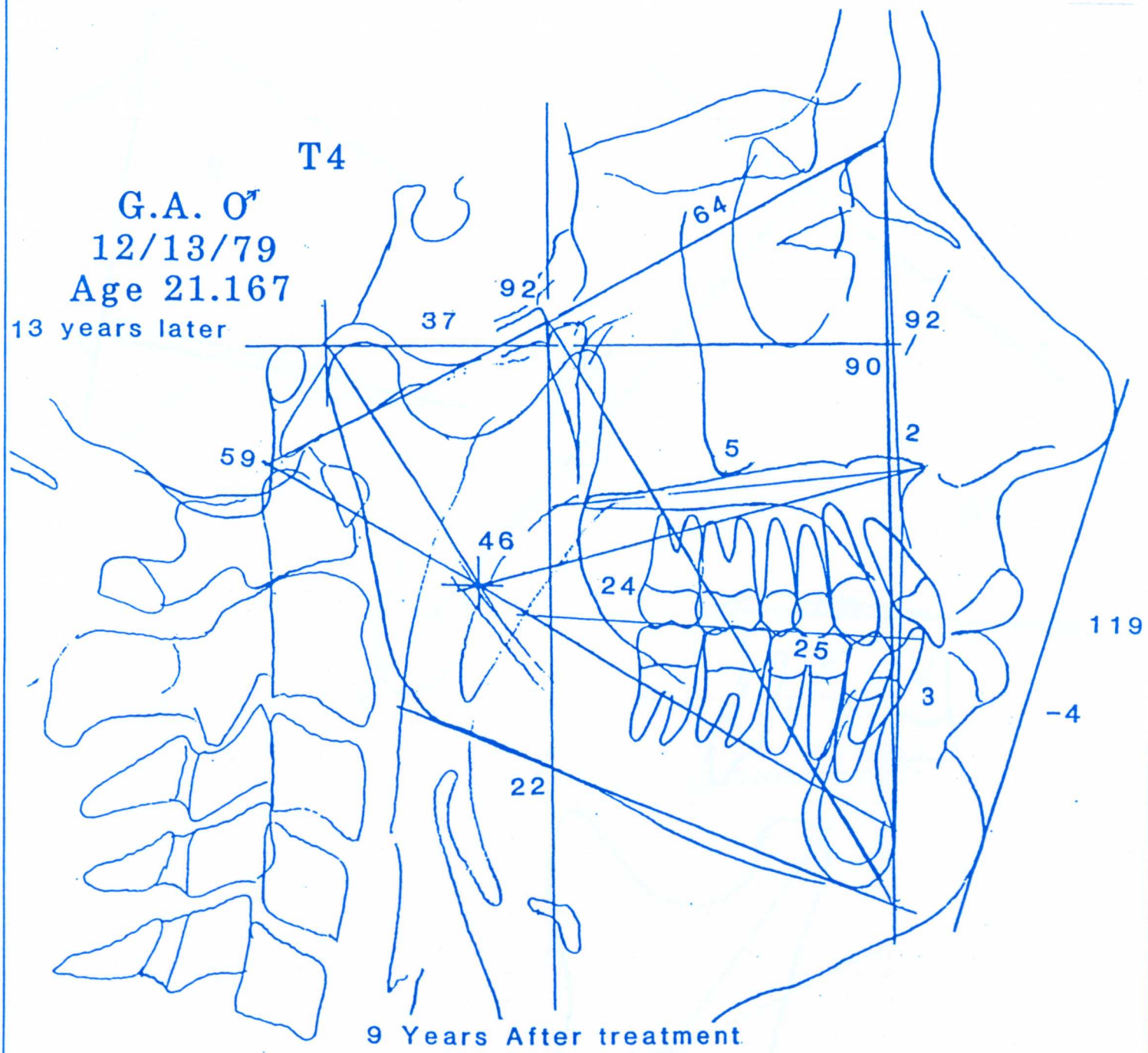
Age 11-7



C

Tracings of models at retention (C) compared to original (B) and data of normal arch dimension (A).

FIG. 10-5-xix



T4 analysis of G.A. at age 21. Note 2 mm. convexity but 92° Facial Axis.

FIG. 10-5-xx

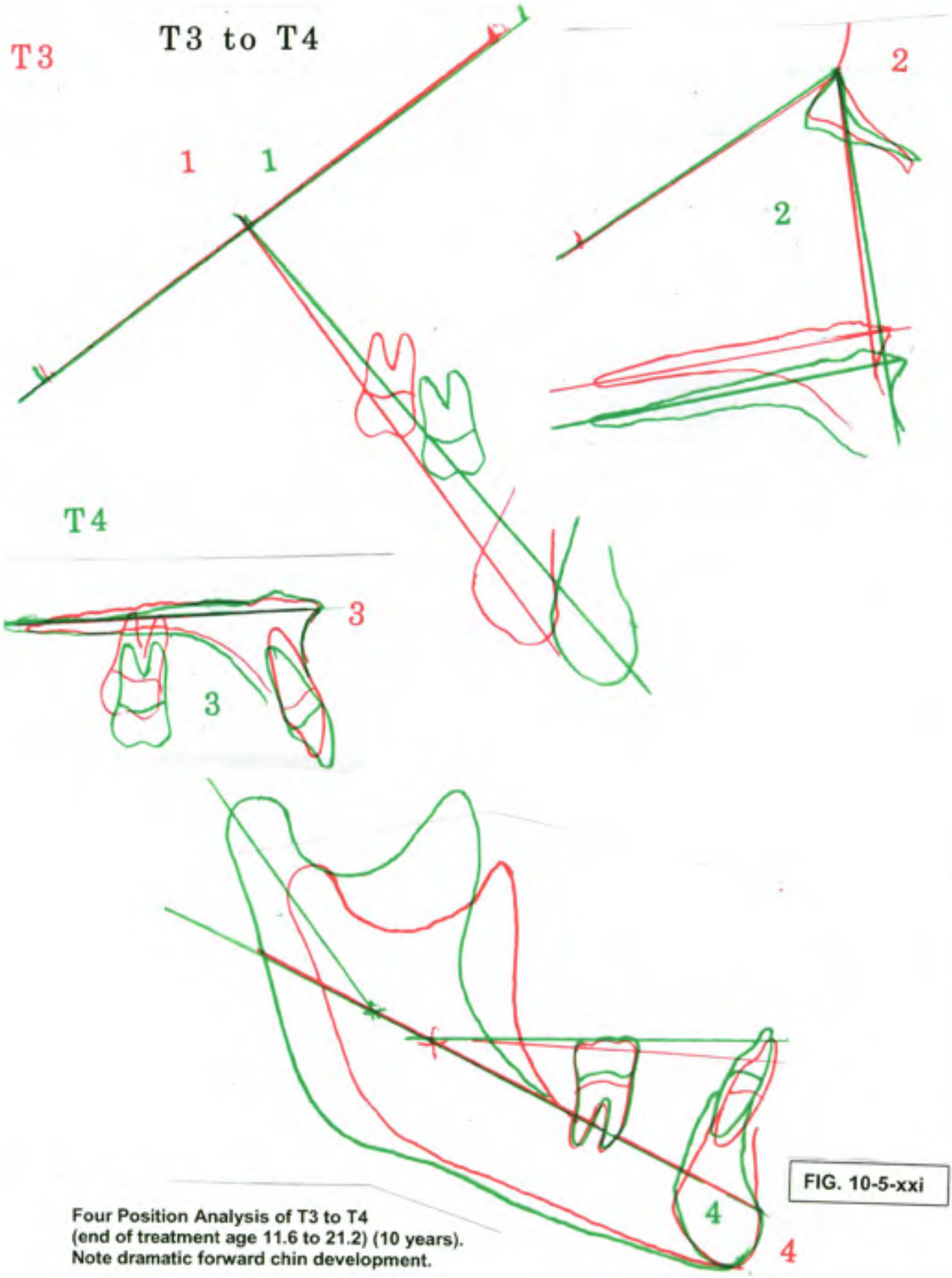
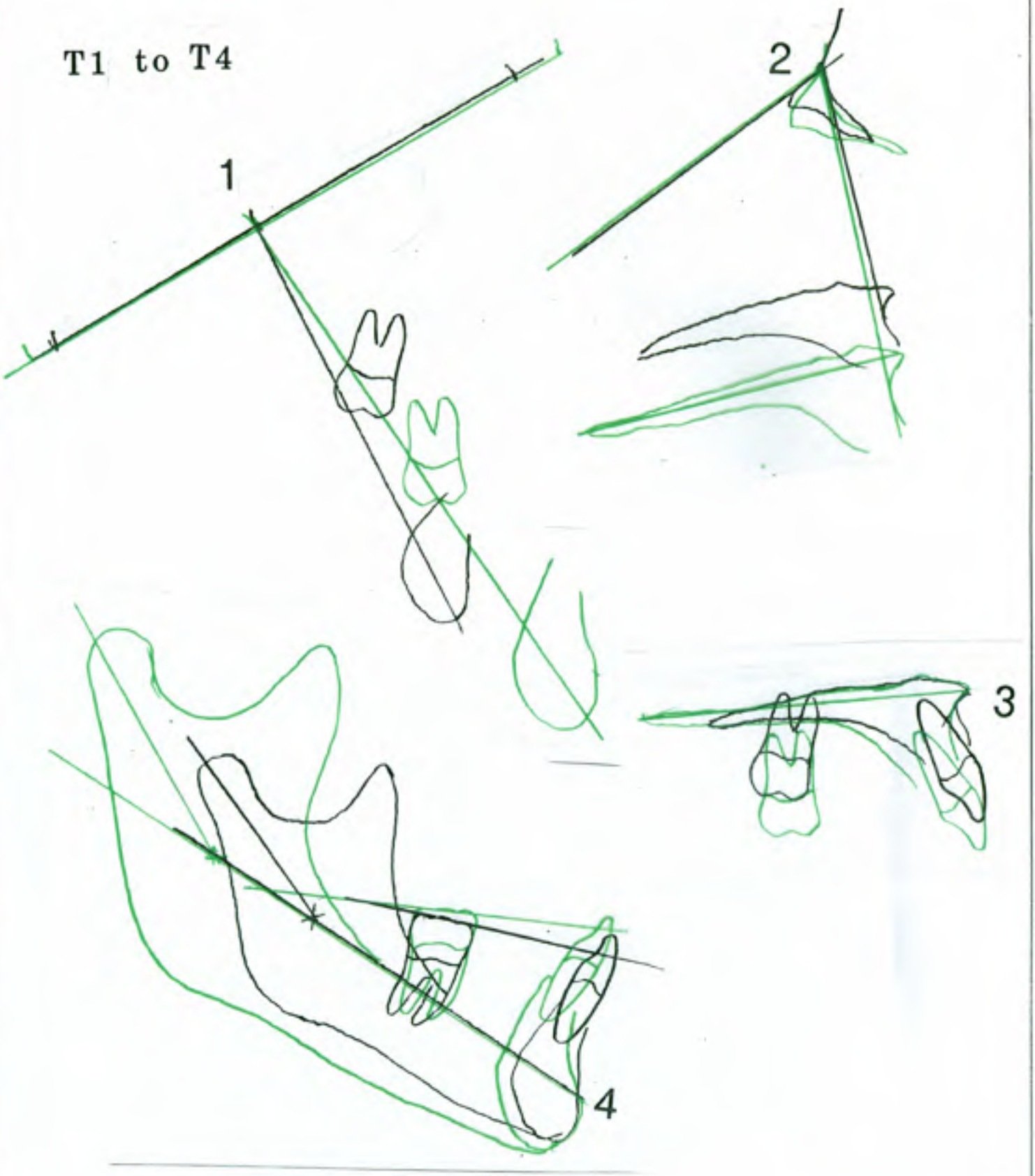


FIG. 10-5-xxi

Four Position Analysis of T3 to T4
(end of treatment age 11.6 to 21.2) (10 years).
Note dramatic forward chin development.

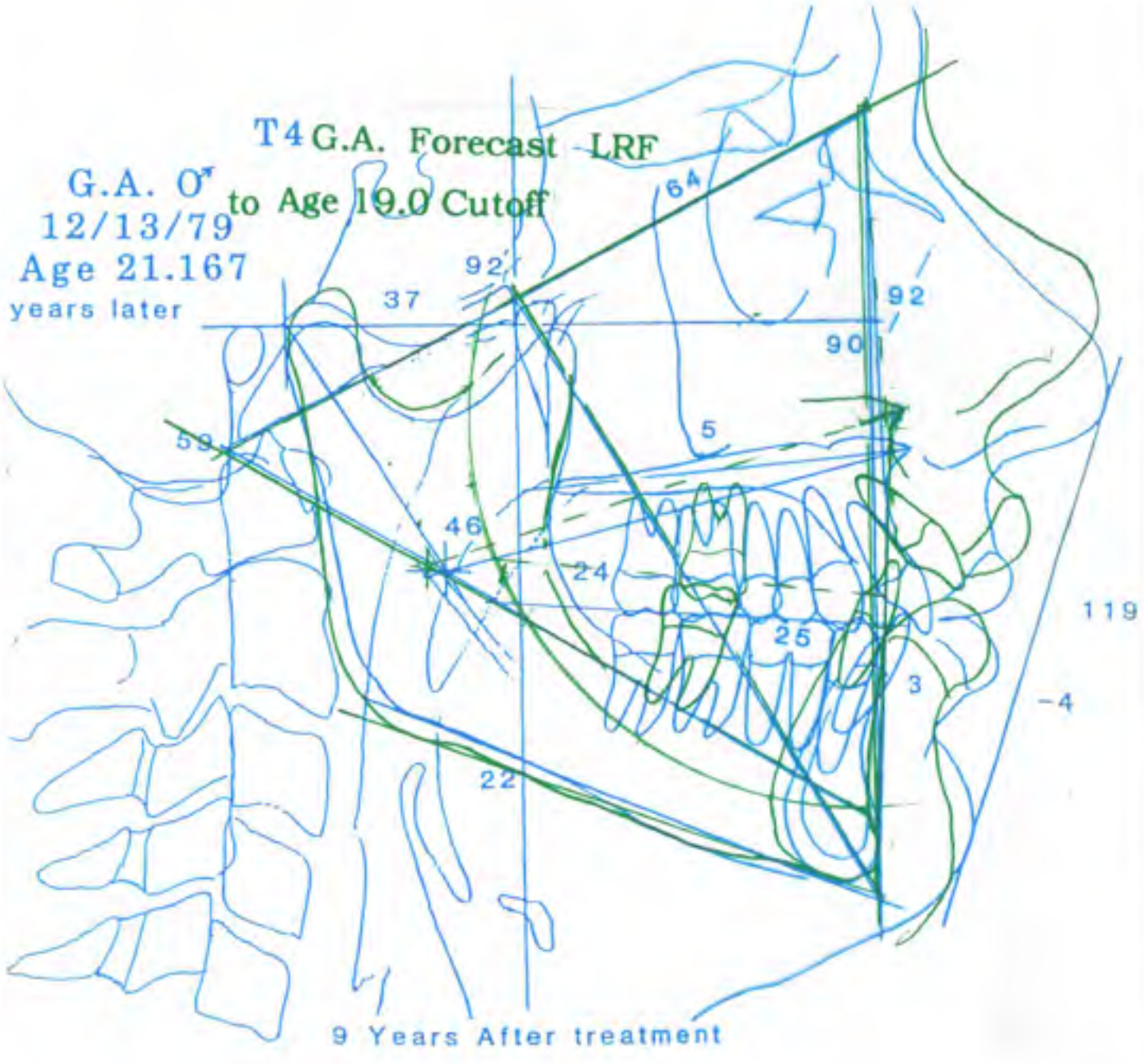


Four Position Analysis from age 6 to age 21. Note chin in Position 1. Note still same orthopedics in 2. Note no forward movement of upper arch, and Occlusal Plane change.

FIG. 10-5-xxii

Profile view of G.A. at age 21 (1979).
Note excellent proportions.

FIG. 10-5-xxiii



Comparison of Forecast without treatment (Green) to actual (Blue) at age 21 superimposed on Position 1. Note reduction of maxillary teeth – Note vertical change in maxilla and the difference from predicted condition.

FIG. 10-5-xxiv

LEGENDS FOR 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. Head films at age 18 showing balance and symmetry.

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

IV. EARLY MIXED DENTITIONS WITH CLASS II LINGUAL CROSS-BITE - *Group Three*

Case #6 J.E. = Class II Open bite with lingual Cross bite Age 6

This patient presented with an early complicated Class II openbite cross-bite with mandibular deflection and thumb sucking. The Class II and the cross-bite was more severe on the right side.

The initial records reveal a problem with maxillary asymmetry **(Fig. 10-6 series)**.

Treatment

Treatment with the quad-helix was started immediately on the second deciduous molars for the purpose of (1) cross bite correction, (2) the production of mandibular centering and (3) mitigation of the thumb habit. The first permanent molars were not yet sufficiently erupted for extraoral treatment. The quad helix started the Class II correction as it skewed for more action on the right side.

In four months, the permanent molars were banded and face bow-cervical traction was applied. **The spacing of the two central incisors suggested mid palatal suture stretching as a result of the head gear therapy.** The patient wore the head gear every third night after one year in order to maintain the over correction and the molar bands were retained.

When later the canines erupted, typically mesial in position, additional .030 round wires were soldered onto the base headgear arch wire. They were fashioned with loops and bent for hooks in order to use the headgear to reduce the canines. **No other treatment was ever employed.**

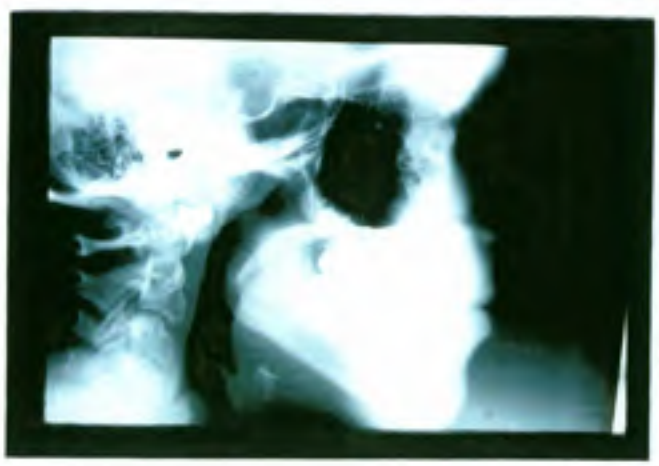
The results at maturity were satisfactory and the patient went on to win a local beauty contest.

A

B

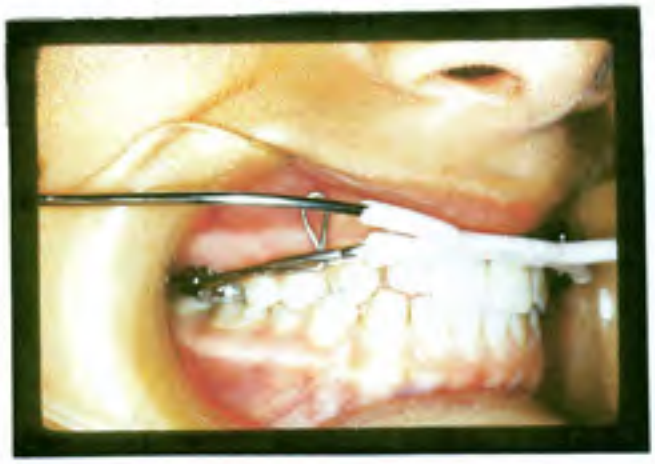
C

D



Case # 6 - 1

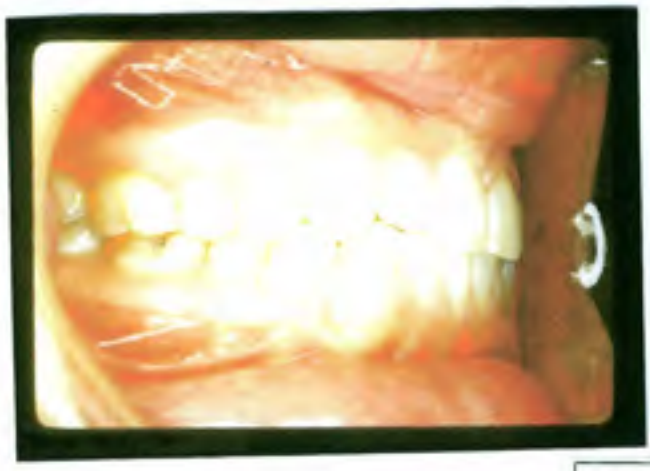
A



B

C

D



Case # 6 - 2

LEGENDS FOR CASE # 6

Case # 6-1 J.E. Mixed Dentition, Class II, Open Bite

A. Note the mandible deviation and early recession.

B. Photos and models at age 6 years.

C. Lateral and frontal head films. Note lip strain, note congested and narrow nasal width. Note midline asymmetry.

D. T3 after cervical traction only after short period of quad helix.

Case # 6-2 J.E.

A. At permanent dentition, hooks were attached on dental bow for canine "cinching" backward after which retainer was placed on the upper.

B. Condition when Ricketts type retainer was employed.

C. Lower third molars erupted at age 16.7. Patient won a beauty contest at age 19.

D. Occlusal conditions at age 22 and frontal symmetry was good at 16.7.

Case #7 H.T.? Age 7.8 yrs – A complete Class II Deep bite with unilateral buccal cross bite

This patient presented with (1) a mixed dentition, (2) a severe unilateral buccal cross-bite, (3) a full Class II, (4) a closed-bite and (5) the mandible was deviated to the right side on closure from rest position and the asymmetrical face was fuller on the left side. No periodontal problems were evident. Frontal cephalometrics showed the mandibular deviation and maxillary asymmetry. The lateral tracing suggested the maxillary molar to be 16 to 17 mm. forward of the pterygoid vertical (10 mm. is normal for that age). The convexity was 7 to 8 mm. The lower incisor was 6 mm. above the true buccal occlusal plane.

Treatment

A Contraction cervical traction type head gear was worn for 11 months. The neck strap was tightened to 500 grams. A fixed lingual expansion arch was employed for the lower molars management. After cross bite reduction was obtained, a bumper in .045 steel was applied to counter the lower lip tension and convert the lower lip pressure to the labial of the upper incisors.

The upper molar was moved distally eight (8)mm. Analysis revealed that **about one-half of the change was due to orthopedics and one-half orthodontics.** In one year, the upper molar would have moved forward 1 mm or more. Therefore the effective change was at least 9.0 mm. In addition, the bumper moved the lower molar slightly distally thereby changing the position of the target tooth (the lower molar). This required additional distal molar movement for correction. A straight maxillary wire was placed directly from the molar to the upper incisor in order to intrude and close the diastema. Later, the mandibular incisors were banded and straight .016 x .016 arch was employed to help manage the overbite.

At the permanent dentition phase at age 10 yrs., full appliances were employed with the .018' brackets. Retention was placed at age 11 (an age when commonly treatment was started.

Records one year later (at age 12) revealed that the midline had relapsed. **The fault was that the midline was not overtreated sufficiently**. (How easy it is to be fooled) Sectional mechanics was not at that time as appreciated as it came to be later.

Post treatment head films and tracing were obtained at 14.9 yrs. Head films 9 years after treatment (at age 20.4 years) showed the third molars erupted and in function. The tracing at age 14.9 precisely superimposed over all the head structures at age 20.4.

However, the patient was checked again at age 22 yrs and it was found that, to our chagrin, all third molars had been needlessly extracted on the advice of her general dentist. What a pity. She needed them for vertical support in her brachy facial type.

Comments on these Cases – Countering the Wedge Effect Idea

These two patients and the two previous children severely challenge the cliche the "wedge effect". All were Class II treated with cervical traction. All witnessed dramatic distal molar movement.

In addition, the latter two had cross bites, one lingual and one buccal, which is thought to compound the mandibular rotation. Neither however, experienced negative mandibular behavior.

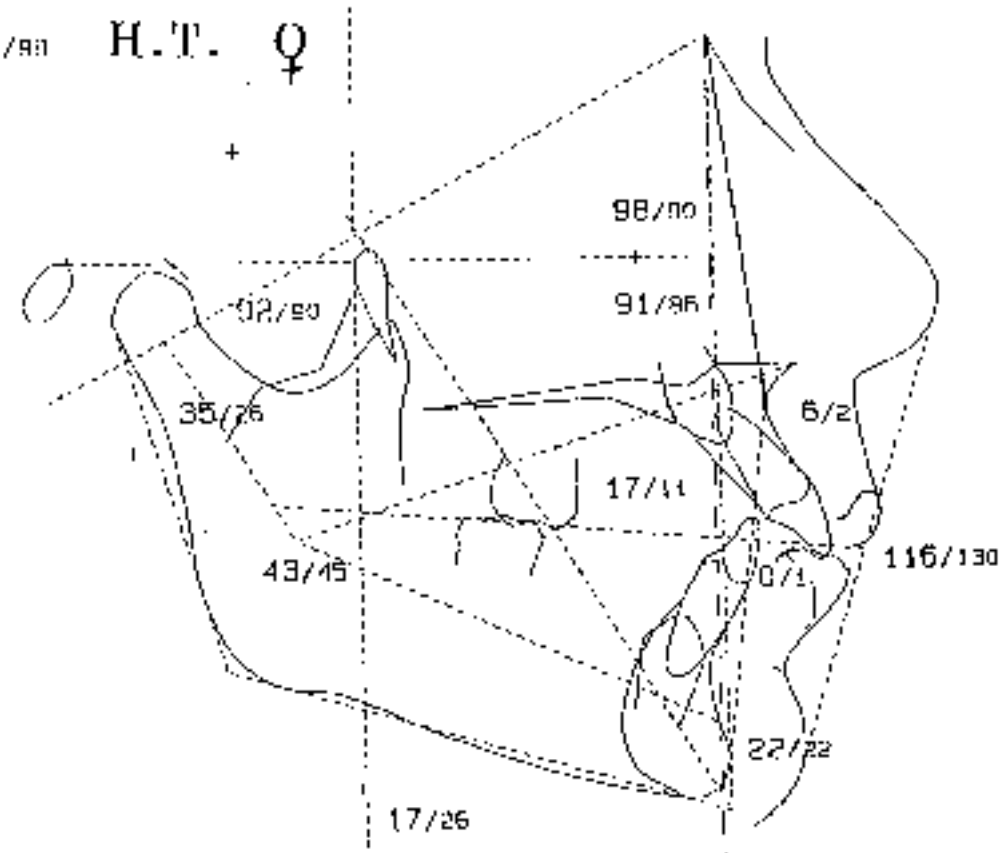
The long range forecasts proved remarkably accurate. Without damage to the condyle the mandible stands to grow normally and position itself within one degree on the Facial Axis.

RMO™

DR. R.M. RICKETTS
F (CA) Caucasian
AGE: 7.9
X: 07/09/67 - A: 09/17/90

TRACING
T1 BEFORE TREATMENT

H.T. ♀



FACIAL PATTERN: BRACHYFACIAL

# FACTORS	MEASURED VALUE		NORM		CLINICAL DEVIATION	
Interincisal Angle	115.7	dg	130.3	dg	-2.4	**
Convexity	6.1	mm	2.3	mm	1.9	*
Lower Facial Height	43.5	dg	45.0	dg	-0.4	
AG Polar Position to FTV	16.8	mm	10.9	mm	2.0	**
S1 to A Po Plane	0.4	mm	1.0	mm	0.3	
A1 Inclination to A Pc	22.0	dg	22.0	dg	0.0	
Facial Depth	90.8	dg	90.3	dg	1.5	*
Facial Axis	92.2	dg	90.0	dg	0.6	
Maxillary Depth	97.8	dg	90.0	dg	2.6	**
Mandibular Plane to FH	15.9	dg	26.3	dg	-2.2	**
Mandibular Arc	34.9	dg	31.6	dg	2.3	**

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The computer analysis of H.T.
T1. This unilateral deepbite-cross bite Class II was facially asymmetrical. Note short lower face height.

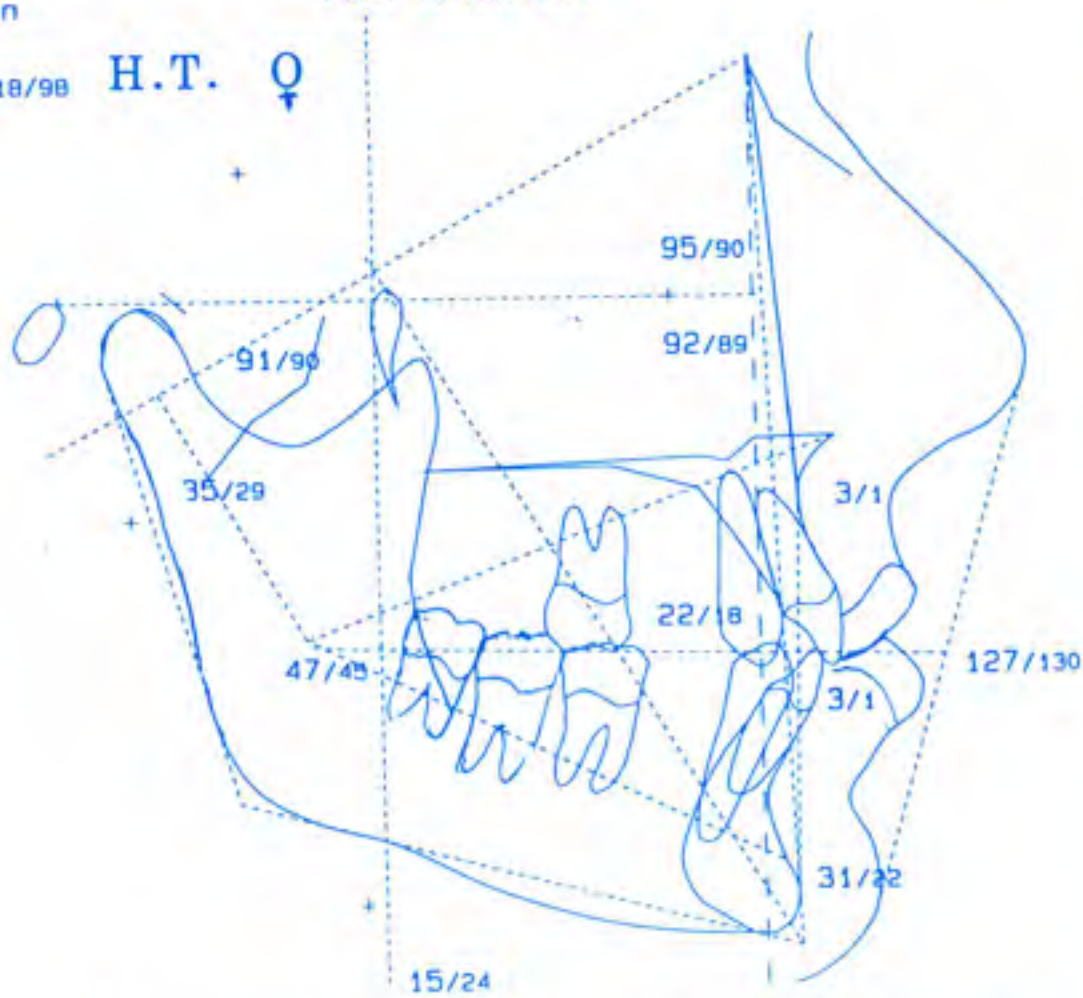
FIG. 10-7-I

RMO™

DR. R.M. RICKETTS
F (CA) Caucasian
AGE: 18.9
X: 07/01/68 - R: 09/18/98

T4 TRACING
POST RETENTION

H.T. ♀



FACIAL PATTERN: BRACHYFACIAL

# FACTORS	MEASURED VALUE	NORM	CLINICAL DEVIATION
Interincisal Angle	126.9 dg	130.0 dg	-0.5
Convexity	3.2 mm	1.0 mm	1.1 *
Lower Facial Height	46.6 dg	45.0 dg	0.4
A6 Molar Position to PTV	21.6 mm	18.0 mm	1.2 *
B1 to A-Po Plane	2.7 mm	1.0 mm	0.7
B1 Inclination to A-Po	30.8 dg	22.0 dg	2.2 **
Facial Depth	92.2 dg	88.6 dg	1.2 *
Facial Axis	91.5 dg	90.0 dg	0.4
Maxillary Depth	95.3 dg	90.0 dg	1.8 *
Mandibular Plane to FH	15.2 dg	24.2 dg	-2.0 **
Mandibular Arc	35.1 dg	29.2 dg	1.5 *

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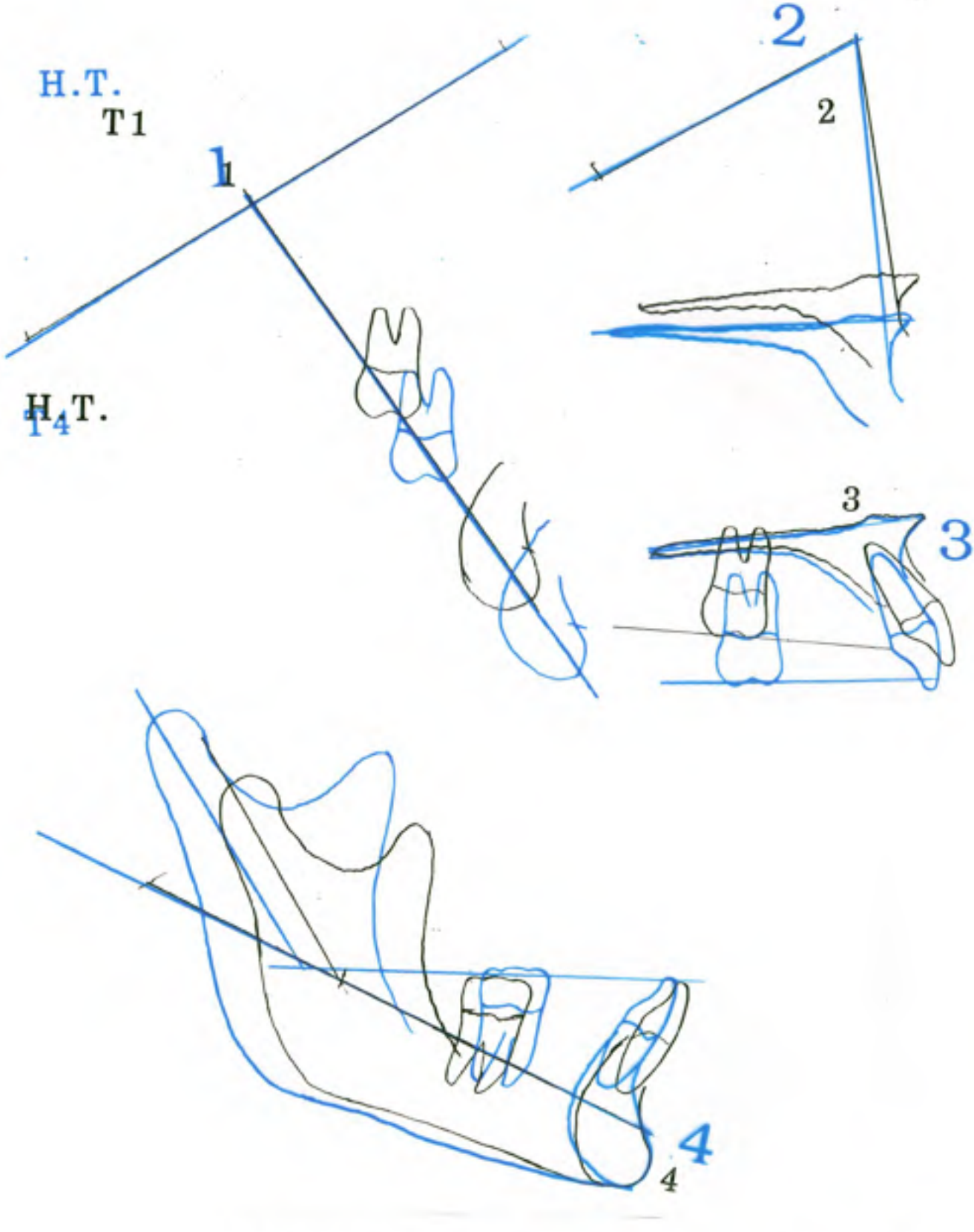
After retention in Patient H.T. Note third molar erupted.

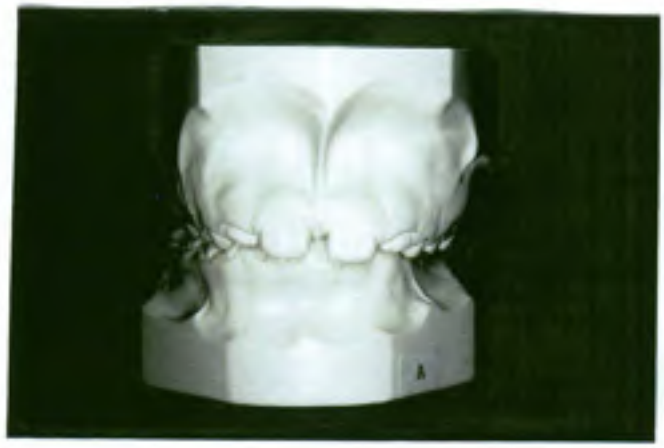
FIG. 10-7-ii



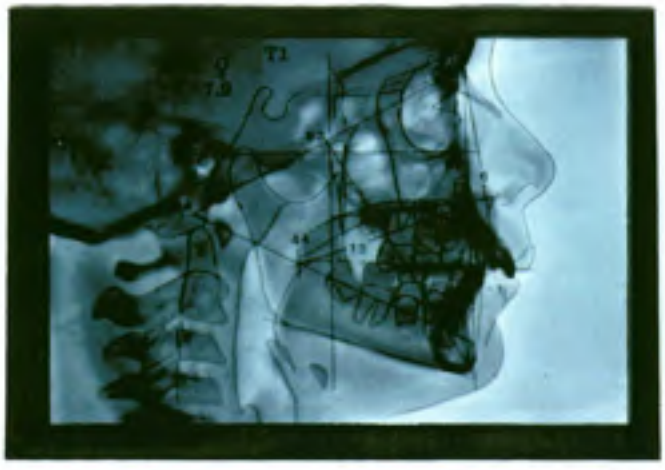
A Four Position Analysis showing growth and treatment changes in H.T.

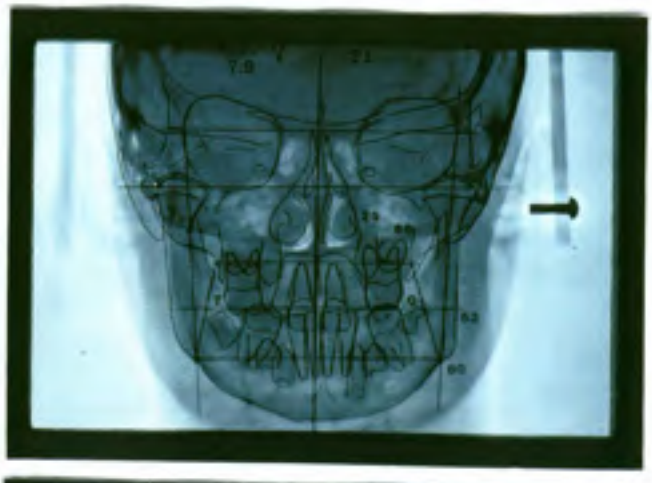
FIG. 10-7-iii

A



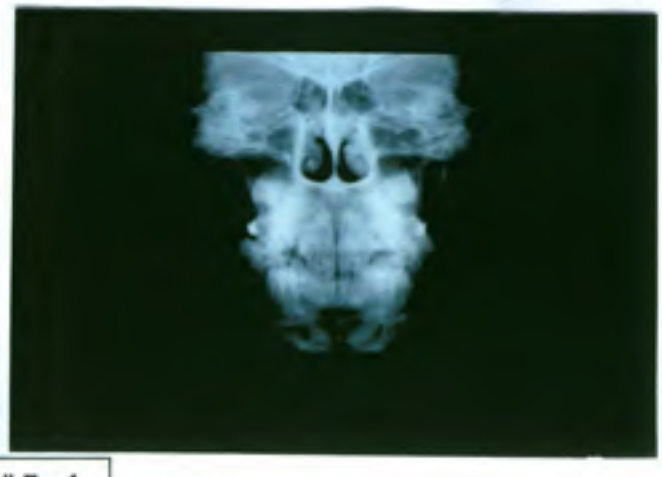
B





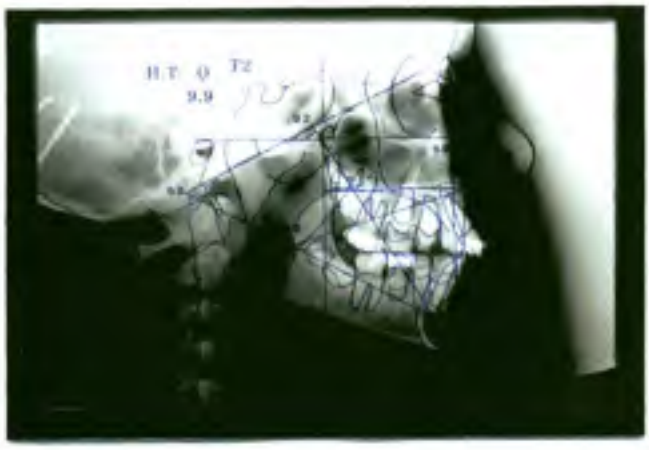
C

D

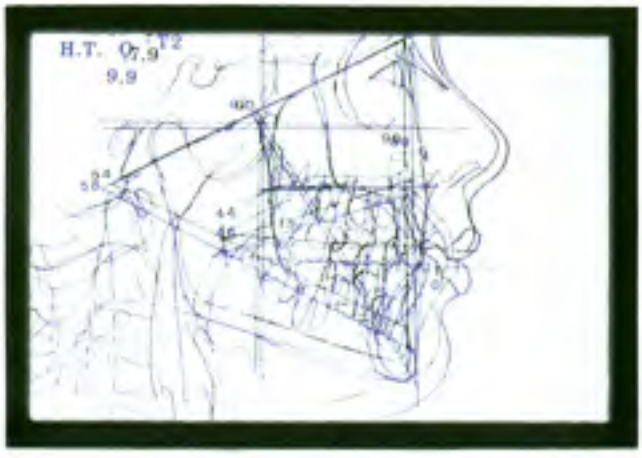


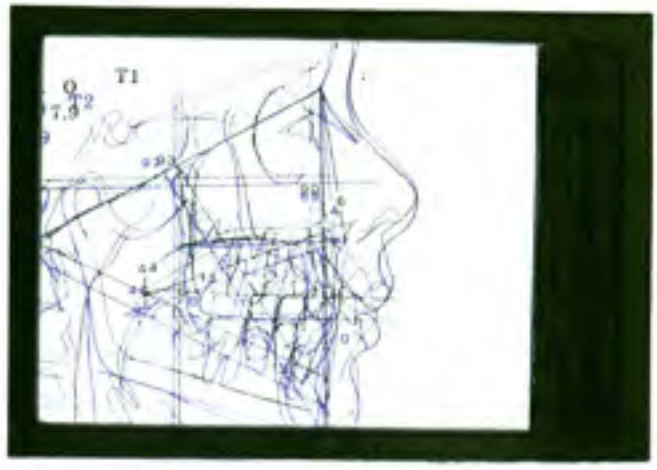
Case # 7 - 1

A

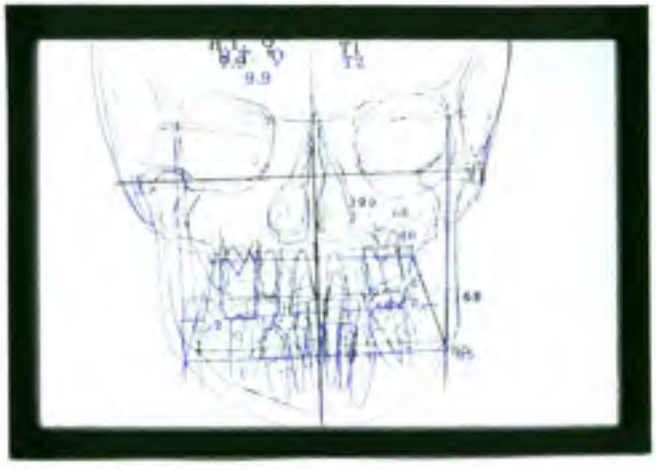


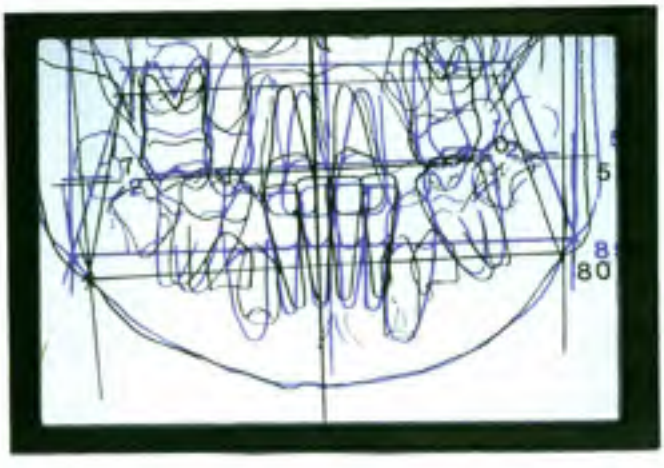
B





C





D

Case # 7 - 2

A

B

C

D

Case # 7 - 3

LEGENDS FOR CASE # 7

Case # 7 – 1

A Child at age 7.9 H.T. with unilateral buccal cross-bite and complete closed bite and severe Class II.

B. Tracings superimposed on the head plate. The P.A. films shows the cross-bite on the left side.

C. Note the asymmetry was evident in the soft tissue. Major tooth movements were required in all but the lower molars.

D. A bumper was employed to anchor the lower molar and improve lip position (apologies for the light exposure). The frontal symmetry was produced.

Case # 7 – 2

A. Tracings superimposed at age 9.9 show excellent progress.

B. Despite the cervical traction for Class II and cross-bite correction, the Facial Axis maintained as shown by Position 1. In Position 2 the orthopedic change was significant.

C. Growth in the frontal from the frontal coordinates. Superimposed on the Occlusal Plane lower first molar movement was most evident.

D. From a publication showing a reduction of upper first molars of 8 mm. (17 back to 9 mm.) from the PTV. Note nice face by age 10 years.

Case # 7-3

A. The frontal progress film with concatenated arches at age 11.6. From age 7 to 11, the Facial Axis was unchanged.

B. Superimposed tracing at age 11.6 at finishing. Position 3 shows retraction of the upper denture.

C. Models at retention.

D. Face and model showing good symmetry.

Case # 7 – 4

A. R.T. from 7 to age 14.9. Note stability of Facial Axis in Position 1. Note good stable result at age 20.4 years.

B. Intraora photos at age 20.

C. Excellent condyle position. Frontal growth from 7 to age 20.

D. The tracing at age 14.9 superimposed over head plate at age 20.4 showing no change in the growth whatsoever but the lower third molars had corrected. Unfortunately all third molars were removed by her dentist after they were in function.

IV. MIXED DENTITIONS WITH IMPACTIONS AND GERMECTOMY - *Group Four*

Case #8 D.A.*3* Potential Upper Canine Impaction and Germectomy of Lower Third Molars

Some preliminary information for diagnosis is presented with this patient. This boy was seen at age 8.0 with a Class I.. A forecast of impaction of the upper canines. The work-up suggested a long treatment necessity for achieving results which was controversial. Would serial extraction be a feasible choice? The lower arch also was displaced forward. He had an outgoing personality. It was a borderline situation. The decision was made to use an orthopedic approach rather than orthodontic (tooth movement) only.

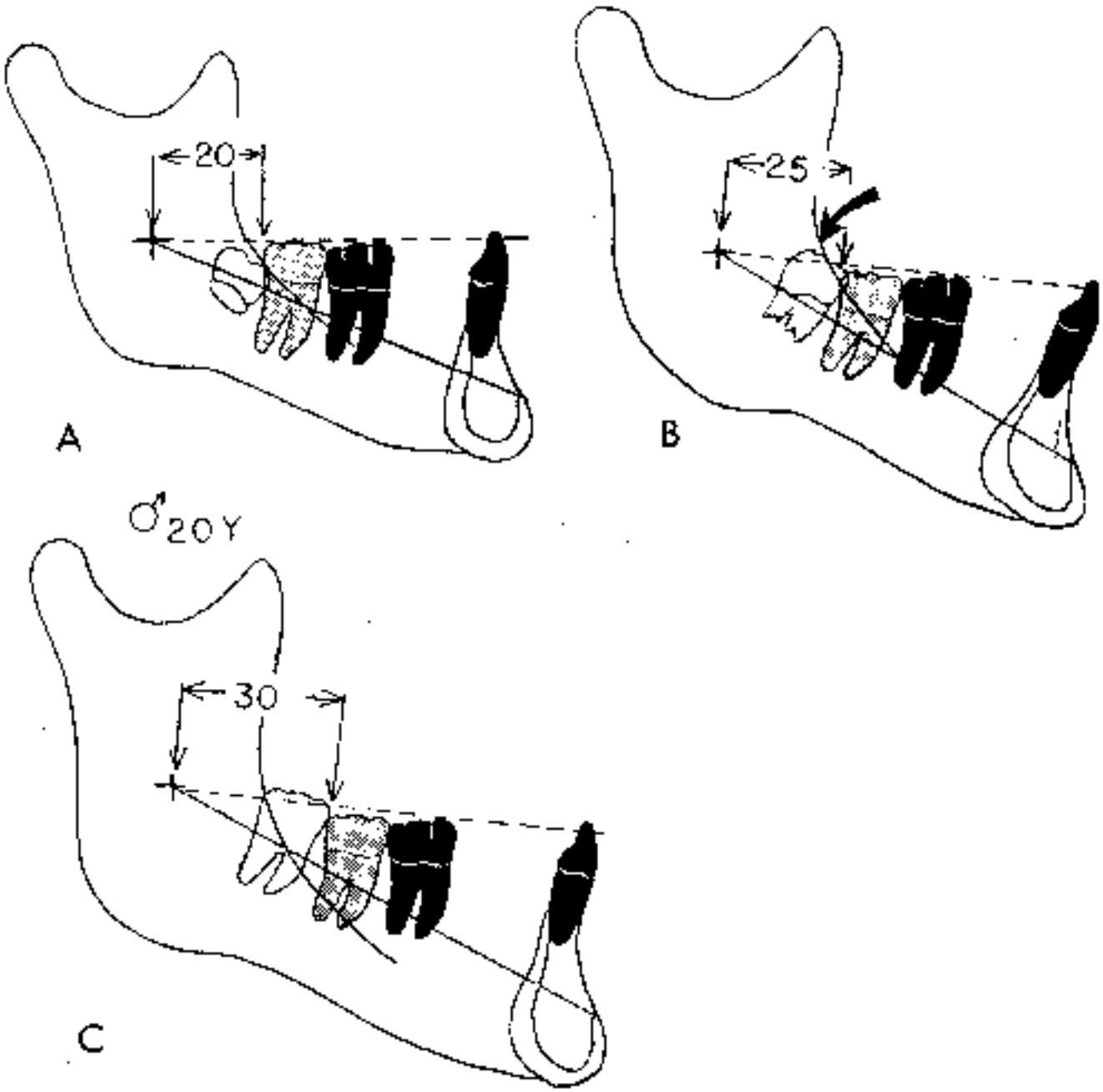
Treatment

Cervical traction was applied to the upper first permanent molars. This was combined with a utility arch on the lower arch. The lower third molars were enucleated as the need was indicated from the forecast. First phase treatment as planned lasted 2 yrs.

At the time of the permanent dentition development, sectional mechanics and Class II elastic traction was employed. The lingually positioned upper left lateral was moved into place.

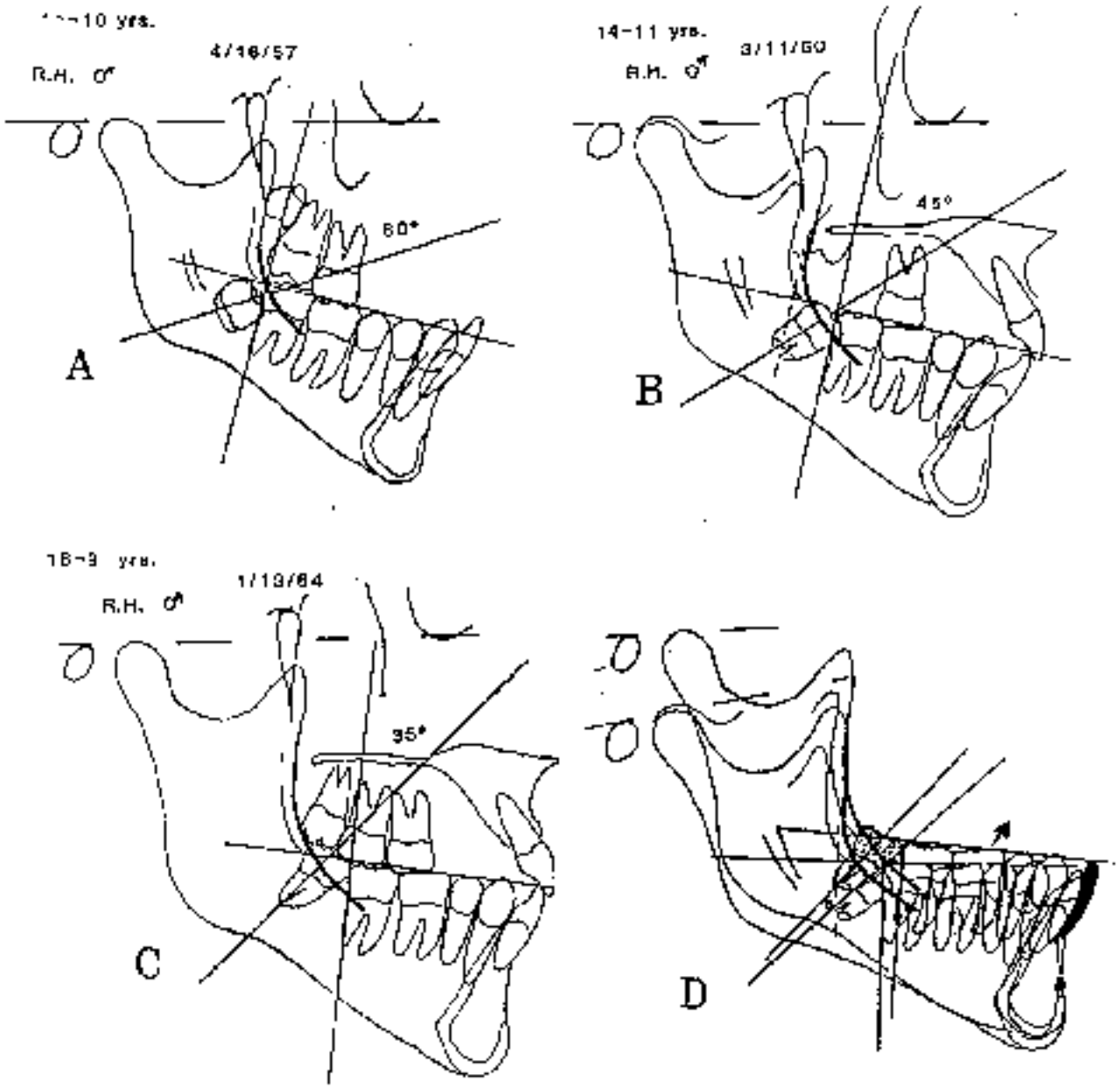
Comments

At maturity this patient was extremely happy with the outcome. The patient could have been treated with extraction but would not have benefited from maxillary orthopedics. The result was highly stable and a full denture fit the young man's outgoing personality. As the face matured, the treatment proved to be a very good choice.



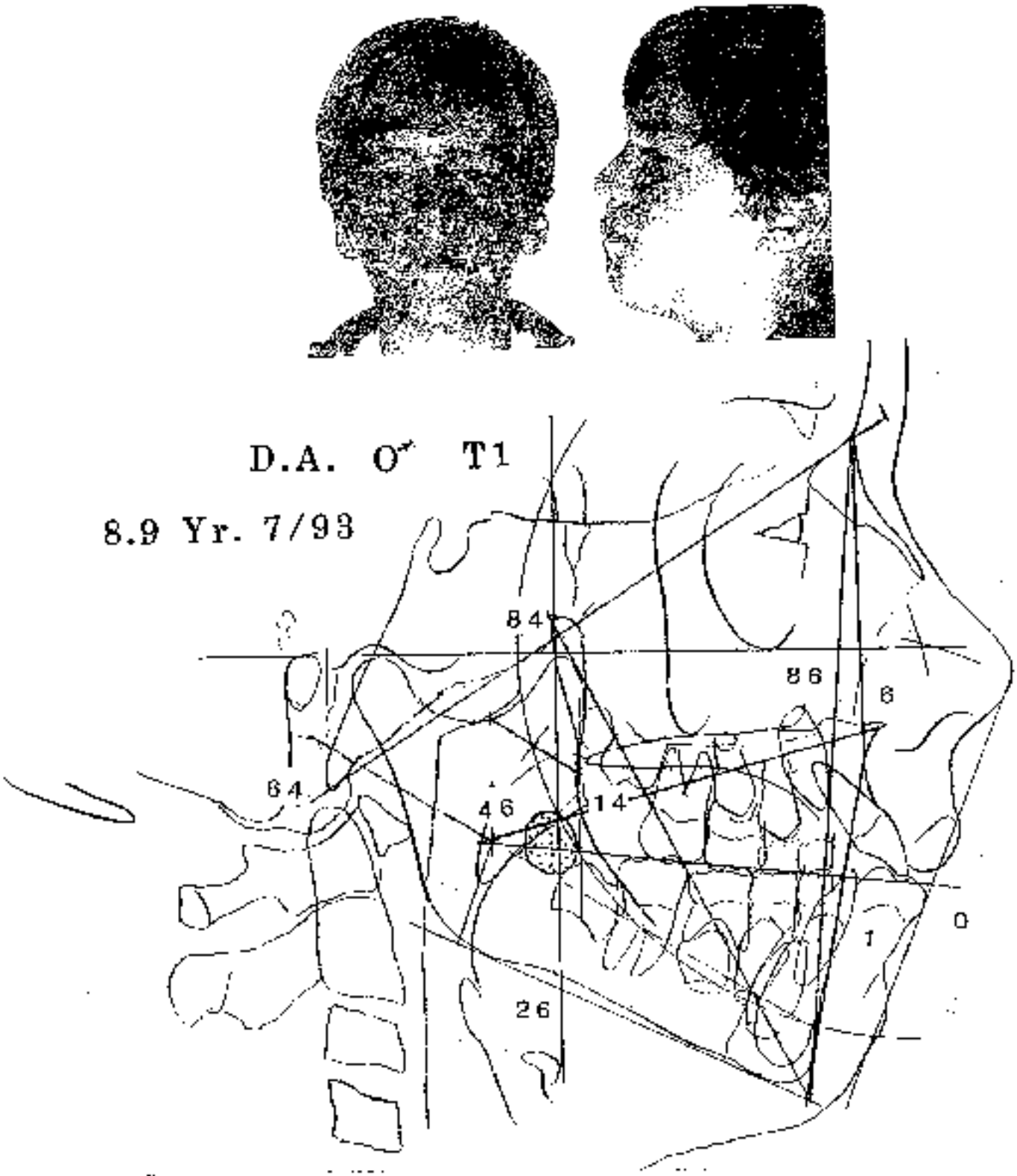
Two methods can help in predicting third molar space.
FIRST is the distance of the second molar to Xi Point. Patient (A) is 20 mm. and received extraction. Patient (B) (25 mm.) is borderline. In (C) there was extra space.
The SECOND method (arrow at B) is to evaluate the third molar relationship to the external oblique ridge. The position can be 50% behind the ridge and have a 50% prognosis. Each one mm. changes the odds 10%.

FIG. 10-8-i



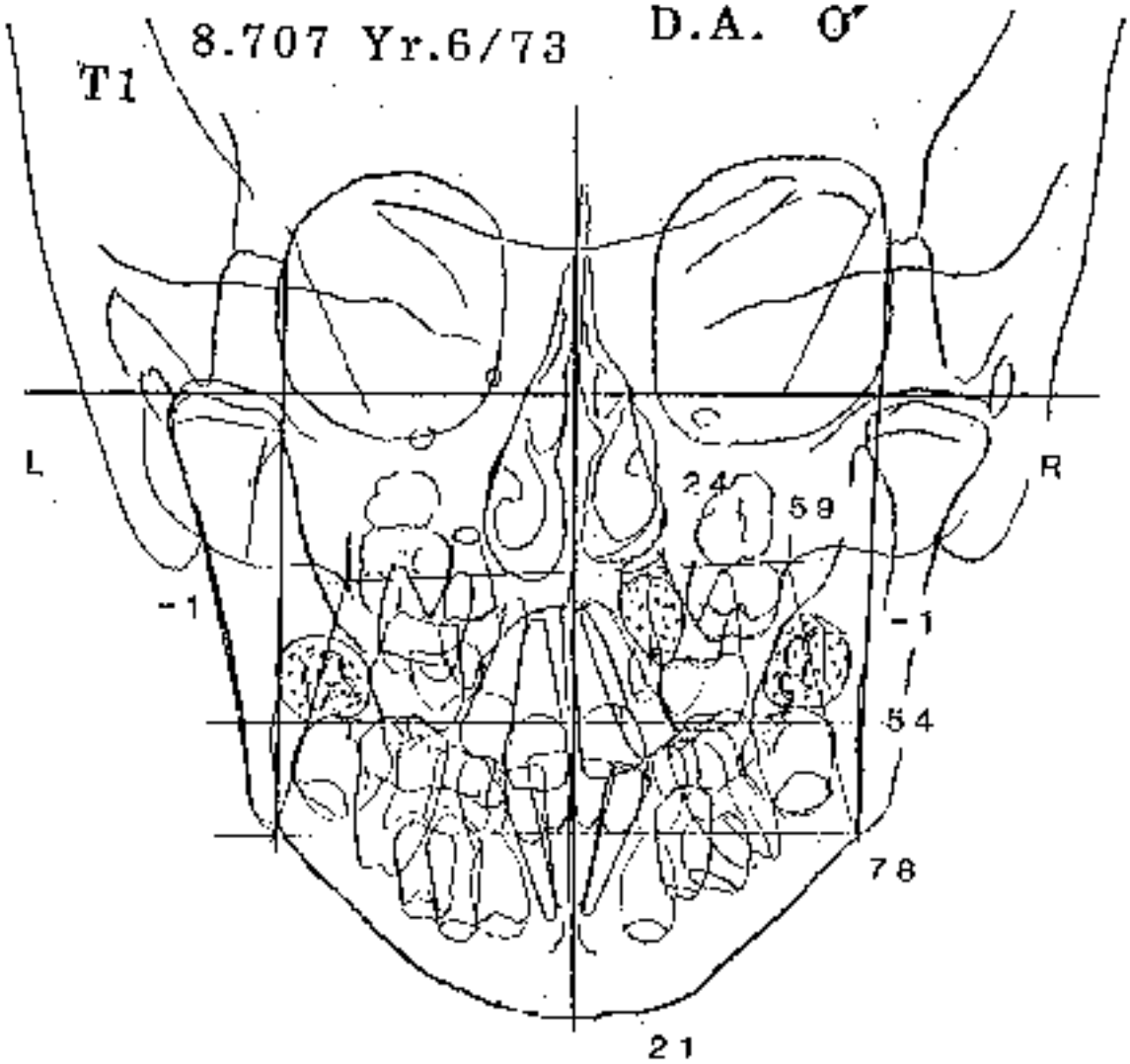
Patient R.H.
(A) was treated with premolar extraction at almost age 15. The third molar was thought to be in a questionable state but space was available by 18.9 years. The boy (C) had full function. (D) a superpositioning as if on the arc, shows the upward and forward eruption of the lower arch.

FIG. 10-8-ii



Male patient almost age 9 years with upper right canine impaction and predicted lower third molar impactions. Tracing is prepared for forecasting. Facial Axis at 84 is negative 2 sigma but oral height is good. Compare to forecast with long range goals. Note lip strain. Note carefully the alar nasal asymmetry.

FIG. 10-8-III



The Frontal Analysis shows a severe nasal floor asymmetry and the upper right canine impacted. Note crypts of lower third molars. The lower arch is also narrowed and molar cross-bite is present.

FIG. 10-8-iv

ROCKY MOUNTAIN DATA SYSTEMS INC.

[redacted]

AGE [illegible] O.D YRS 1 — DR RICKETTS

X-RAY DATE 06/10/73 — DOLO 73 C930

ANALYST JL DATE 07/13/73

COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
LATERAL BEFORE TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
01-MOLAR RELATION	1.0 MM	-3.0 MM	1.3	*
02-CANINE RELATION	4.3 MM	-2.0 MM	2.1	**
03-INCISOR OVERJET	9.5 MM	2.5 MM	2.6	**
04-INCISOR OVERBITE	1.1 MM	2.5 MM	-0.7	
05-LOWER INCISOR EXTRUSION	1.7 MM	1.3 MM	0.2	
*06-INTERINCISAL ANGLE	155.2 DEG	130.0 DEG	-3.1	***
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
*11-CONVEXITY	4.5 MM	1.0 MM	1.9	*
15-LOWER FACIAL HEIGHT	46.7 DEG	47.0 DEG	-0.2	
FIELD III DENTURE TO SKELETON				
*16-UPPER MOLAR POSITION	12.5 MM	12.0 MM	0.1	
*20-MAND INCISOR PROTRUSION	2.3 MM	1.0 MM	0.5	
25-MAX INCISOR PROTRUSION	11.3 MM	3.5 MM	3.5	***
24-MAND INCISOR INCLINATION	13.5 DEG	22.0 DEG	-1.6	*
22-MAX INCISOR INCLINATION	53.1 DEG	28.0 DEG	6.0	***
23-OCCLUSAL PLANE-RAMUS(XI)	-3.0 MM	0.4 MM	-0.9	
26-OCCLUSAL PL INCLINATION	23.6 DEG	22.6 DEG	0.6	
FIELD IV ESTHETIC PROBLEM (LIP RELATION)				
25-LIP PROTRUSION	1.1 MM	-2.4 MM	1.6	*
30-UPPER LIP LENGTH	25.1 MM	24.9 MM	0.1	
31-LIP EMBRASURE-OCC PL	-1.7 MM	-1.4 MM	0.9	
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
*32-FACIAL DEPTH	83.3 DEG	86.6 DEG	-1.1	*
*33-FACIAL AXIS	85.9 DEG	90.0 DEG	-1.2	*
35-FACIAL TAPER	69.1 DEG	62.0 DEG	0.5	
36-MAXILLARY DEPTH	87.7 DEG	90.0 DEG	-0.7	
37-MAXILLARY HEIGHT	55.6 DEG	53.1 DEG	0.2	
38-PALATAL PLANE ANGLE	2.0 DEG	1.0 DEG	0.3	
*39-MANDIBULAR PLANE ANGLE	27.1 DEG	26.1 DEG	0.2	
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
40-CRANIAL DEFLECTION	25.9 DEG	27.4 DEG	0.9	
42-CRANIAL LENGTH ANTERIOR	62.7 MM	57.2 MM	2.2	**
44-POSTERIOR FACIAL HEIGHT	56.7 MM	57.5 MM	-0.2	
45-RAMUS POSITION	72.6 DEG	75.2 DEG	-1.1	*
46-PORION LOCATION (MM)	-44.0 MM	-40.2 MM	-1.6	*
52-MANDIBULAR ARC	26.8 DEG	26.2 DEG	0.2	
51-CORPUS LENGTH	59.7 MM	65.1 MM	-1.1	*

* DENOTES SUMMARY FACTOR ON TRACING

ROCKY MOUNTAIN DATA SYSTEMS INC.

DANNY A[illegible]E — DR RICKETTS

AGE [illegible] O.D YRS [illegible] — DOLO 73 0970

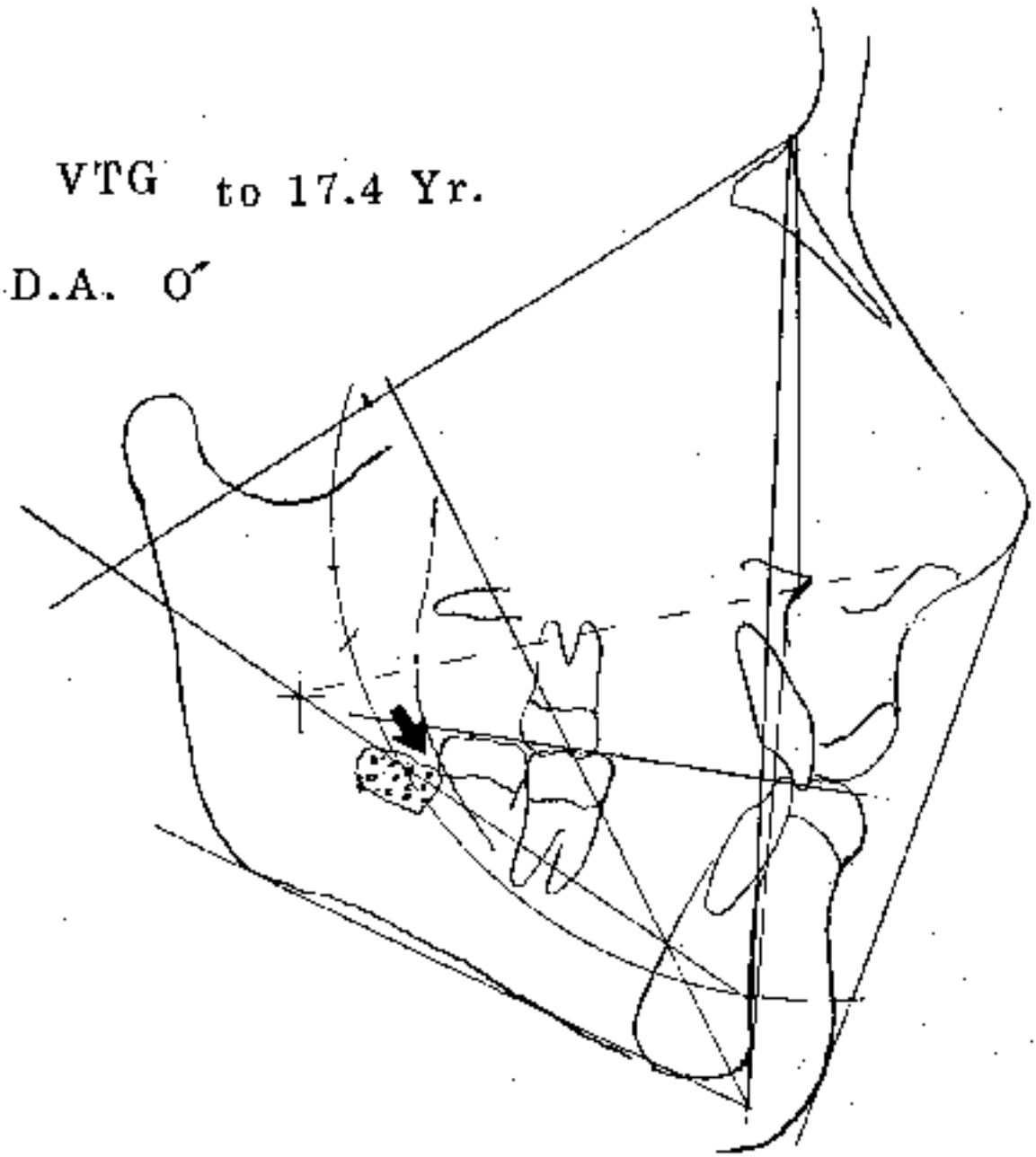
X-RAY DATE 06/15/73 — ANALYST JL DATE 07/13/73

COMPREHENSIVE CEPHALOMETRIC DESCRIPTION
FRONTAL BEFORE TREATMENT

FACTOR	MEASURED VALUE	CLINICAL NORM	CLINICAL DEVIATIONS FROM NORM	
FIELD I THE DENTURE PROBLEM (OCCLUSAL RELATION)				
02-MOLAR RELATION LEFT	5.0 MM	1.5 MM	-1.0	
04-MOLAR RELATION RIGHT	-2.5 MM	1.5 MM	-2.7	**
*06-INTERMOLAR WIDTH (MAND)	55.2 MM	55.0 MM	0.1	
08-INTERCANINE WIDTH (MAND)	15.7 MM	24.2 MM	-1.4	*
*10-DENTURE MIDLINE	0.0 MM	0.0 MM	0.0	
FIELD II THE SKELETAL PROBLEM (MAXILLO-MANDIBULAR RELATION)				
*14-MAX-MAND WIDTH LEFT	-10.2 MM	-10.0 MM	0.2	
*16-MAX-MAND WIDTH RIGHT	-10.6 MM	-10.9 MM	0.2	
21-MAX-MAND MIDLINE	0.0 DEG	0.0 DEG	0.0	
FIELD III DENTURE TO SKELETON				
19-MOLAR TO JAW LEFT (MM)	5.0 MM	6.4 MM	-0.9	
21-MOLAR TO JAW RIGHT (MM)	5.3 MM	6.4 MM	-0.7	
23-DENTURE-JAW MIDLINES	0.3 MM	0.0 MM	0.2	
25-OCCLUSAL PLANE TILT	-2.1 MM	0.0 MM	-2.1	*
FIELD V THE DETERMINATION PROBLEM (CRANIO-FACIAL RELATION)				
33-POSTURAL SYMMETRY	0.6 DEG	0.0 DEG	0.3	
FIELD VI THE INTERNAL STRUCTURE PROBLEM (DEEP STRUCTURE)				
41-NASAL WIDTH	24.5 MM	25.1 MM	-0.1	
43-NASAL PROPORTION	55.7 DEG	59.0 DEG	-0.7	
45-MAXILLA PROPORTION	102.7 DEG	103.0 DEG	-0.2	
47-MANDIBLE PROPORTION	83.7 DEG	80.4 DEG	-0.5	
49-FACIAL PROPORTION	95.1 DEG	97.5 DEG	-0.4	

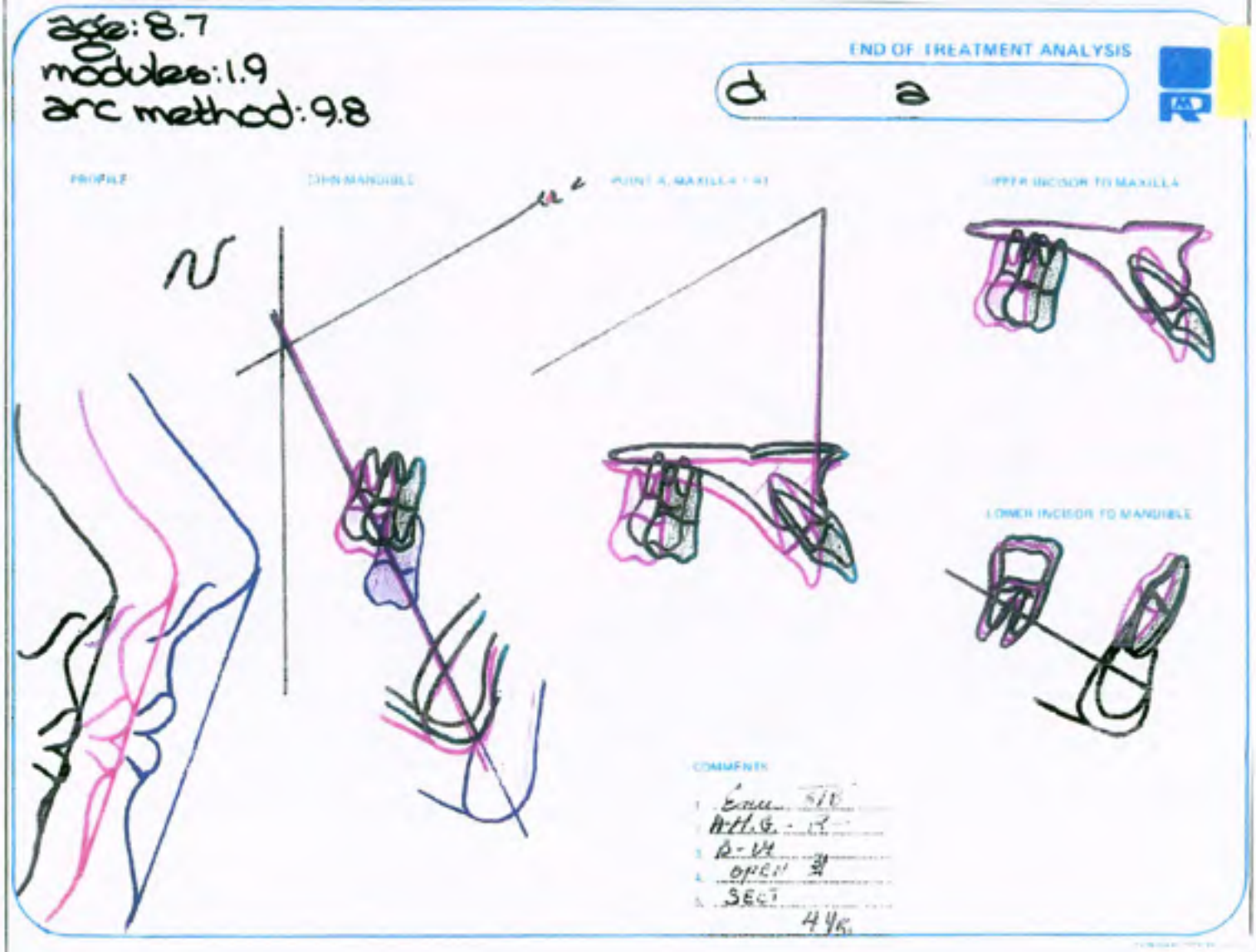
The printout on Patient D.A. Note the dysplasias as signaled by the stars.

FIG. 10-8-V



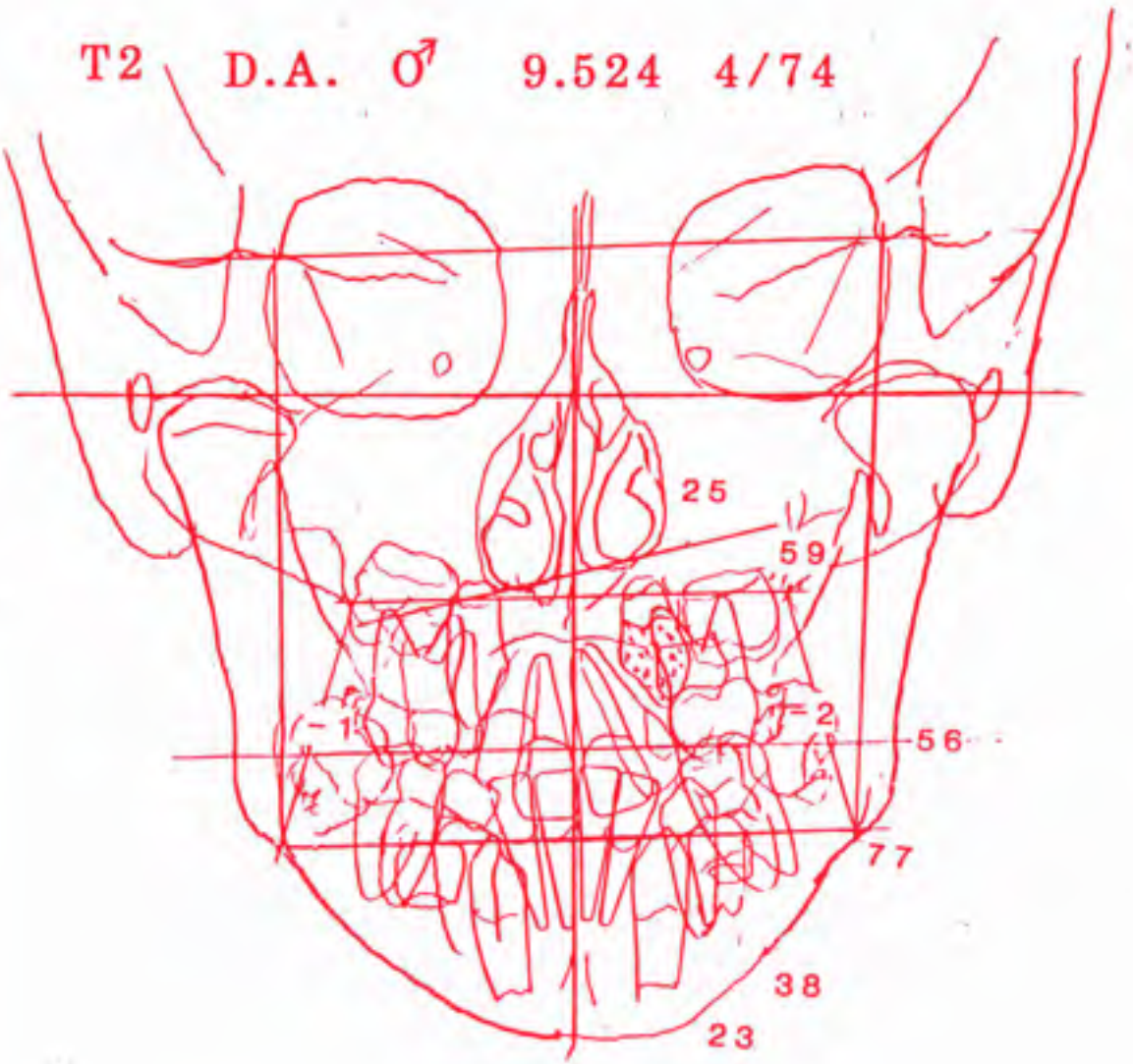
The long range VTG for D.A. to age 17.4 but the patient grew more later. Note a 90% odds of third molar impaction at the arrow.

FIG. 10-8-vi



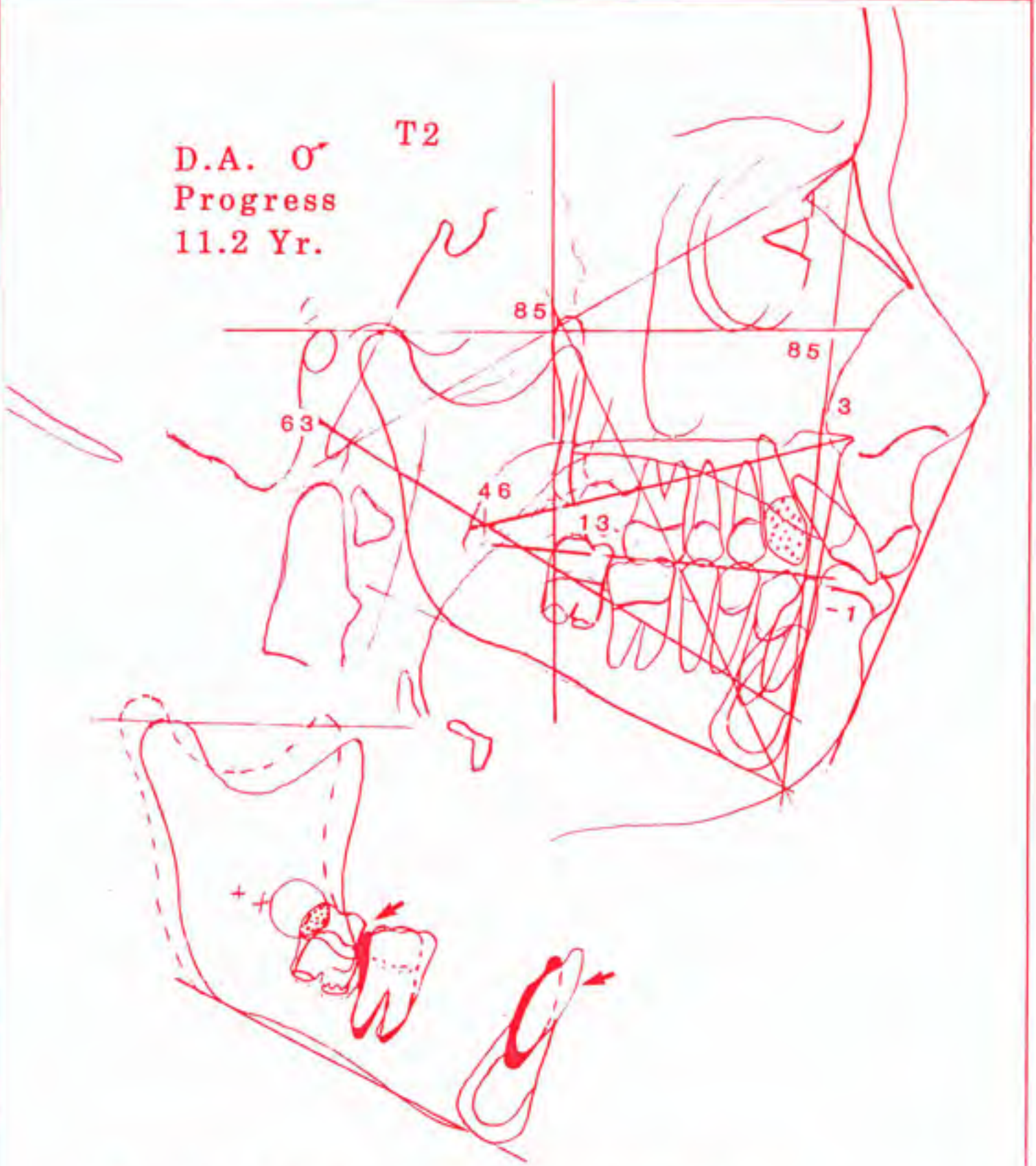
The analysis of the short range (VTO) and the long range (VTG) projections by the program at RMO. Note the distal molar movement indicated and the lower incisor retraction without extraction. Enucleation of $_8T_8$ was performed.

FIG. 10-8-vii



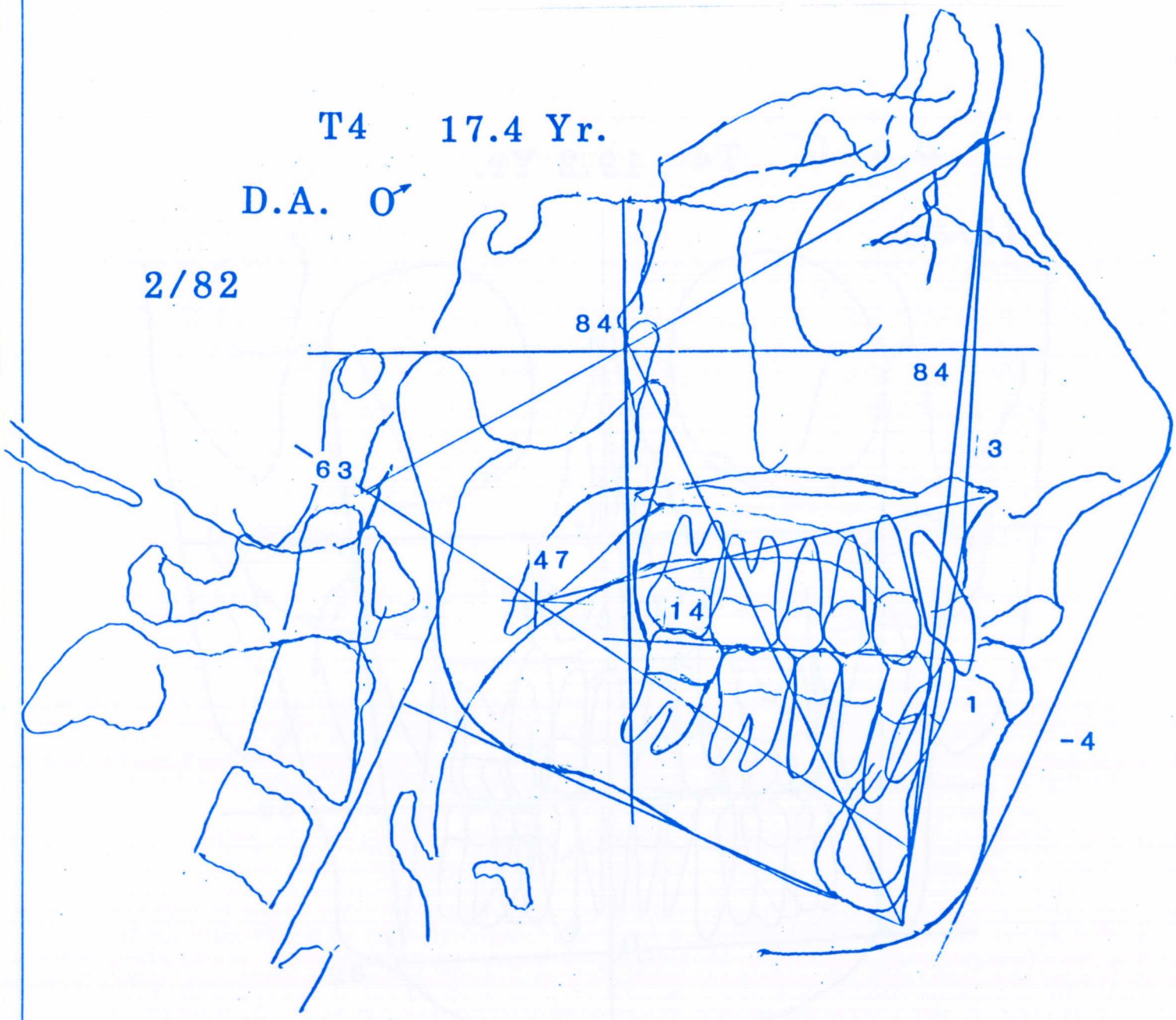
D.A. after six months headgear only to create space for the upper canines.

FIG. 10-8-viii



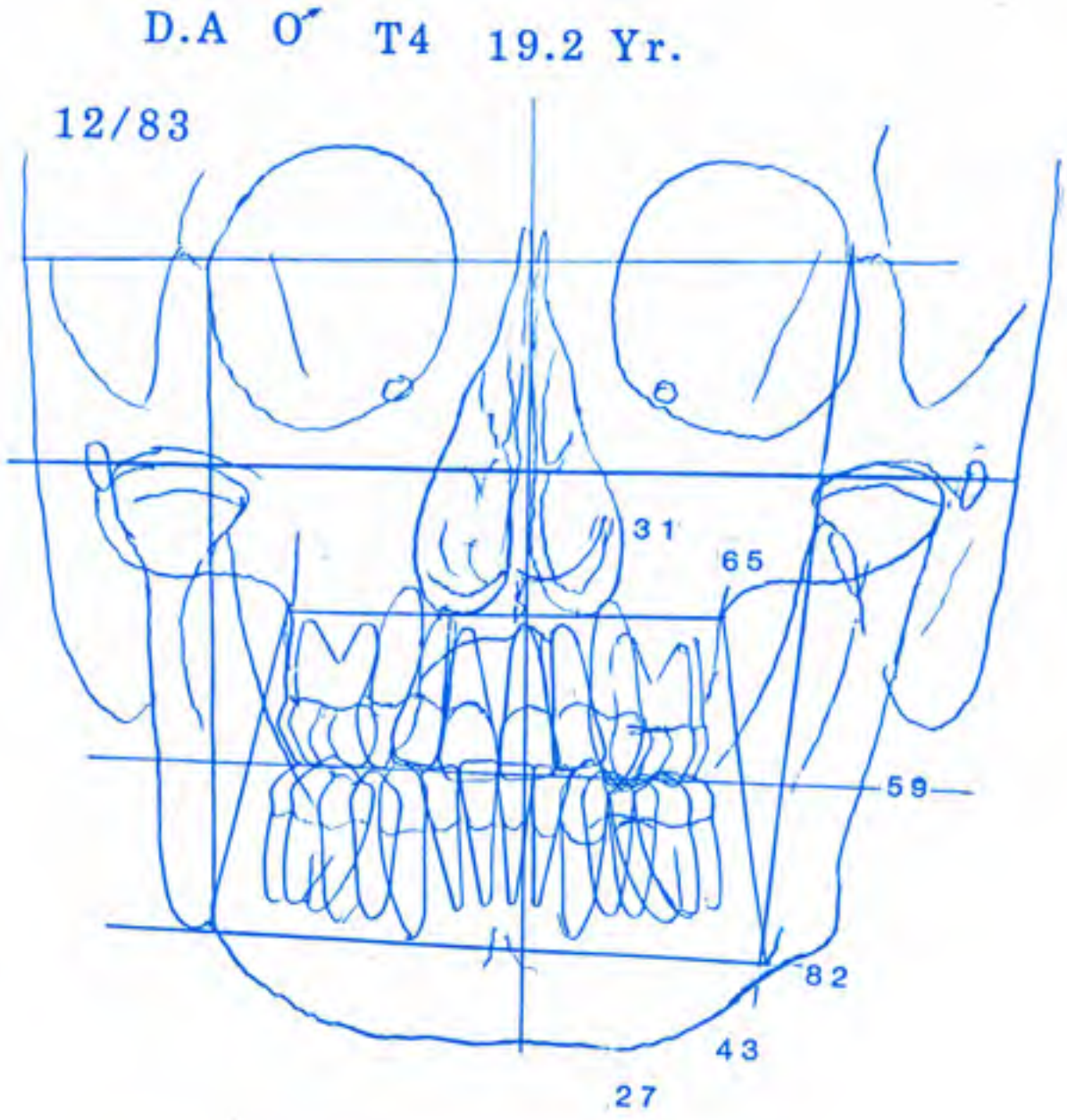
Progress tracing for D.A. Note the opening of upper arch length with headgear force of about 400 grams. Differentially the upper molar has been expanded and moved distally 3 mm. Note the upper canines are responding. Note the rapid distal eruption of the lower second molars of the thirds. Note the distal and intruded action on the lower first molars together with incisor retraction.

FIG. 10–8-ix



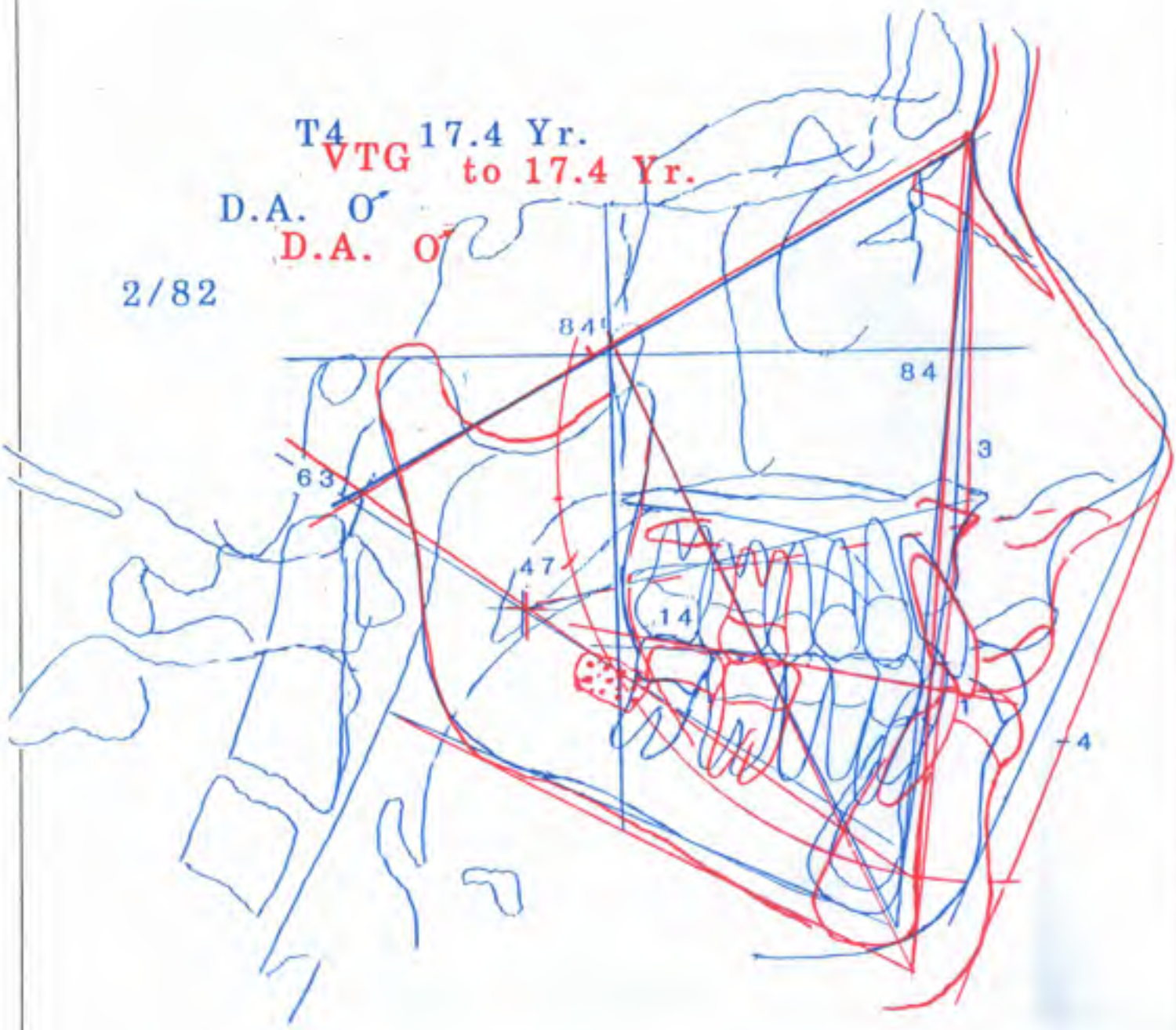
Note the condition at age 17.4. Good facial proportion and denture emplacement is present. The upper molar is 14 mm. but normal controls are at 20 mm. from PTV.

FIG. 10-8-x



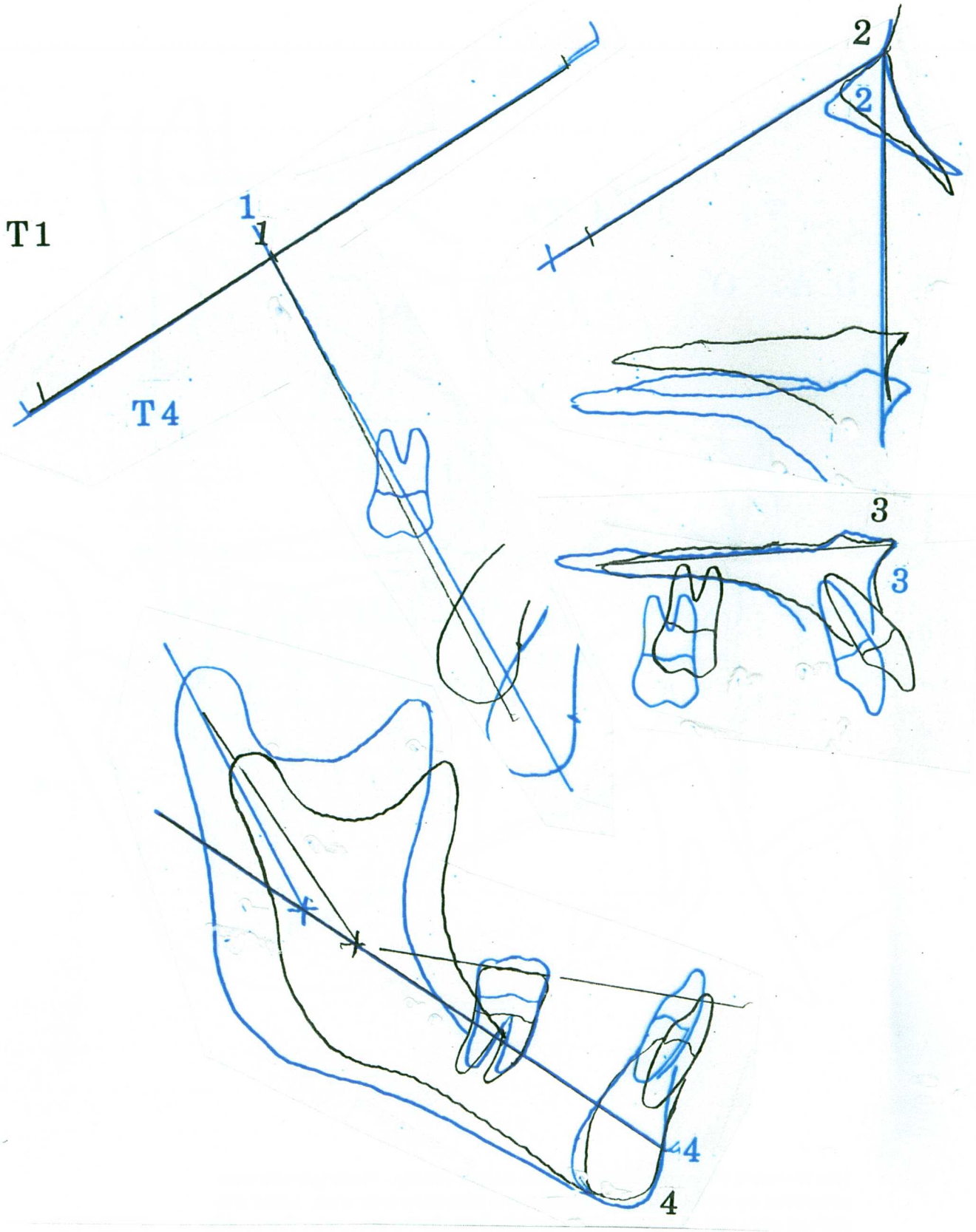
Frontal denture symmetry was present but the upper and lower face were 2 mm. asymmetrical. Good width was present at the lower first premolars (43 mm.).

FIG. 10-8-xi



The forecast (Red) compared to the actual (Blue). More growth was projected by about 5 mm. although the direction was true. Later the patient matured to almost the predicted amounts however, the profile objectives were reached.

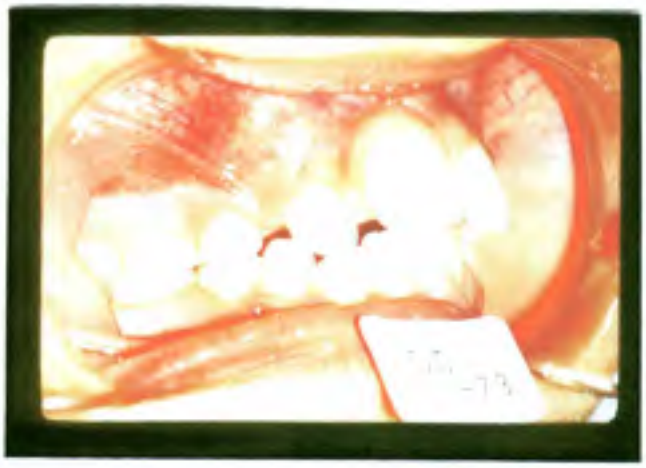
FIG. 10-8-xii



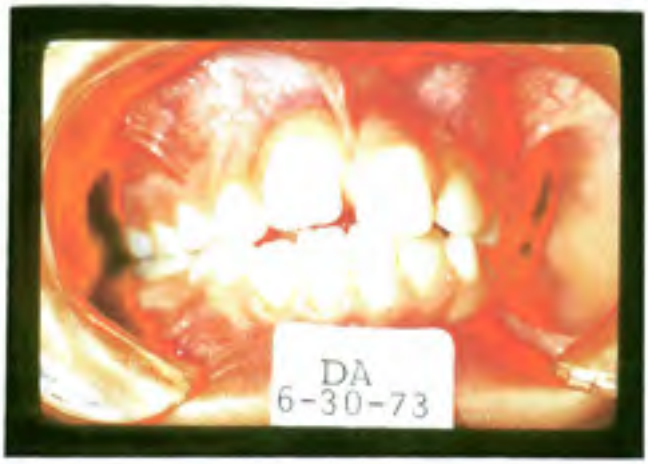
The Four Position Analysis from age 8.3 to 17.4 (8.6 years). Note the closure of the Facial Axis (1) slight maxillary retraction but distal molar movement (3). Note the behavior of the lower incisor and stability of the lower molar.

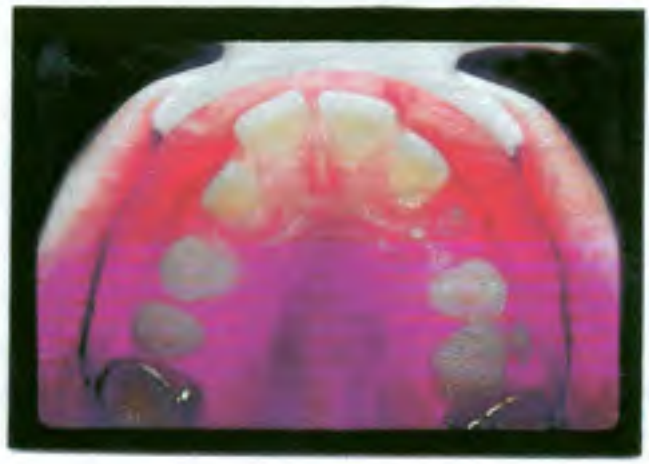
FIG. 10-8-xiii

A

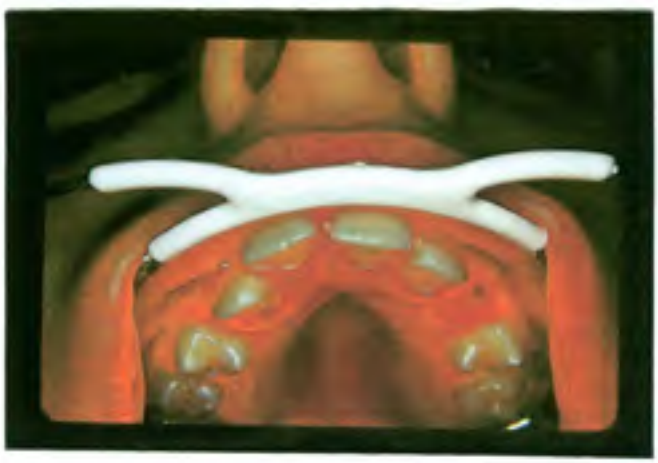


B

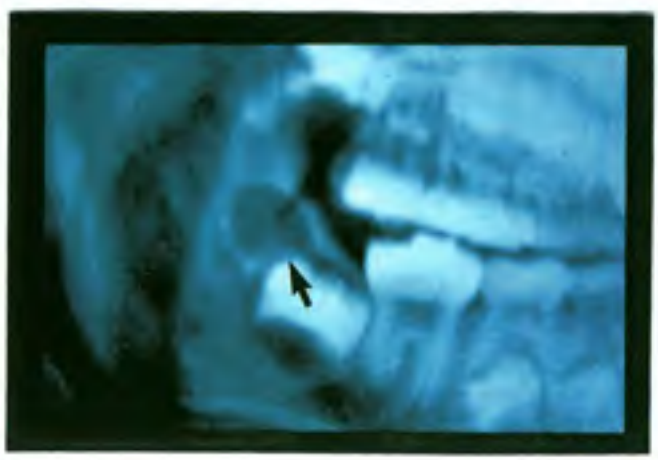




C

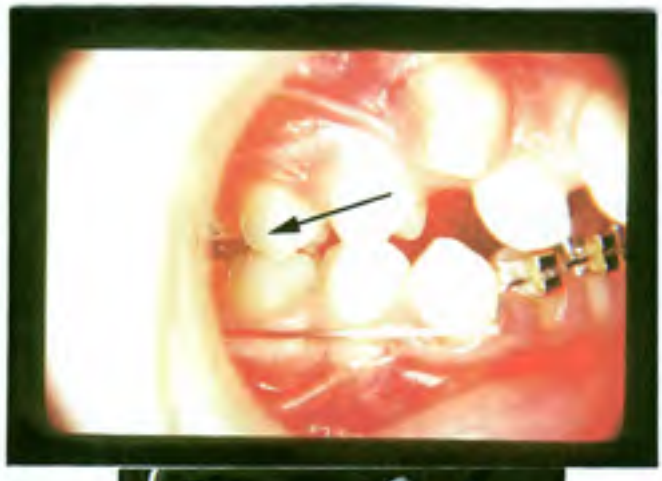


D



Case # 8 - 1

A



B

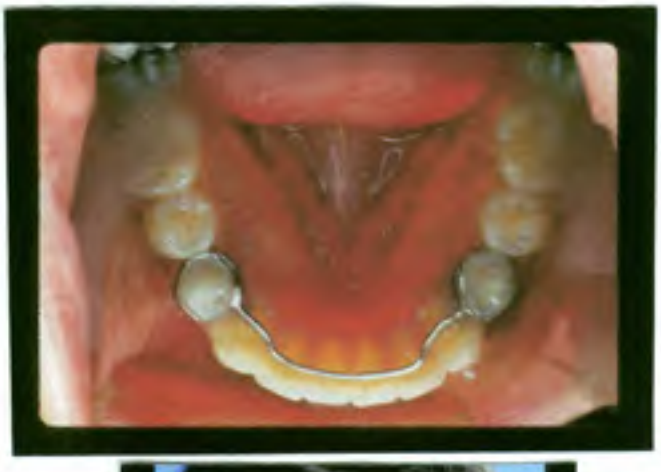
C

D

Case # 8 - 2

A

B



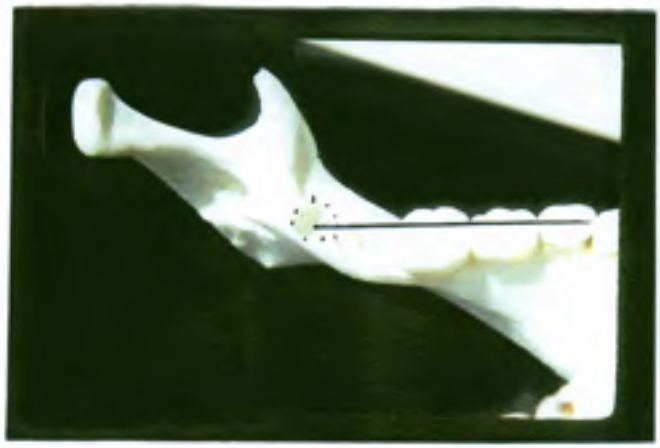
C

D

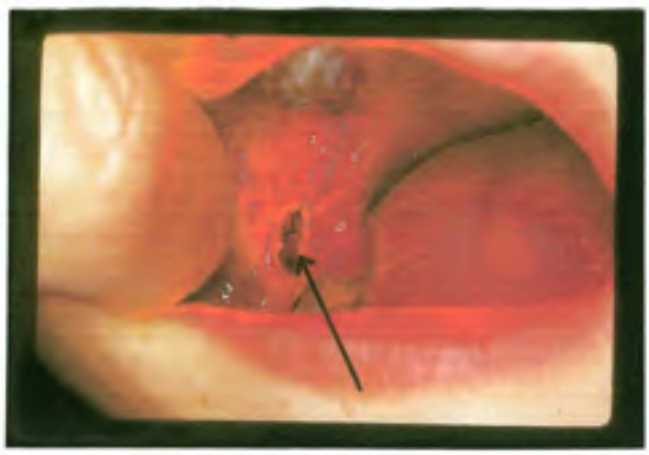
Case # 8 - 3

A

B



C



D

Case # 8 - 4

LEGENDS FOR CASE # 8

Case # 8-1 D.A.

A. The original oral condition was a Class II protrusive condition with a canine impaction on the upper right.

B. Note the narrow upper arch and deviation of the midline. The dental bow acts as a shield from the lip force while the bucca bridge acts on the lower.

C The premolars undergoing "buccal drift".

D The immediate upward and backward freedom of the lower second molar following the enucleation of the third.

Case # 8 - 2

A. The upper molars and premolars were moving backward while the lower arch was moved distally with the utility arch (B).

C. Views of the upper and lower arches at retention.

D. A slight upper diastema was closed with a retainer.

Case # 8 – 3

A and B. Patient D.A. at age 18 years with lower retainer in place. Notice intentionally flared lateral incisors in both arches.

C. Frontal photo showing no lip strain.

D. Beautiful smile and profile at age 25.

Case # 8 – 4

A. Skull of 3 year old subject showing position of developing second molar. Tomograph of skull at age 8 showing crypt of third molar on the occlusal plane.

B. Crypt on a plane with buccal cusps in two specimens.

C. Treatment ? of incisors and emptied crypt in the procedure.

D. D.A. clear third molar area at retention and buccal occlusion at age 25.

Case #9 A.L. : Class II Div.1 Closed bite with Horizontal impaction of lower left canine and both upper canines

This female, age 10, was referred by her dentist for consultation. The lower left canine had migrated across the midline to a position in which the crypt was in contact with the root of the canine on the right side. Extraction of that canine and three premolars had been advised by a colleague.

The face was brachyfacial and normal convexity for her age and type was present. The VTO (a set-up on paper) suggested the need for a forward movement of the lower arch and intrusion of the lower incisors.

Treatment

A straight wire intrusion-advancing arch was placed on the upper incisors. In the lower, a Utility arch was employed to move the roots of the lower incisor segment lingually in order to create space to move the canine back across the midline.

Following that, preliminary action surgery was performed to uncover the impacted canine. A channel in the bone was made toward the opposite side. This was a preparation of medullary space to back up the canine and to place it into correct position. A modified lower utility wire was placed with an extension to receive a light nylon thread for moving the canine in a straight lateral direction. A canine band was cut in half and cemented to the crown of the impacted canine. The flap was sutured over the thread. The crypt was not disturbed. The blood in the crypt helps resorb bone.

After six months the canine was backed up and was ready to be elevated. The previous face of the band came off with a wire engaged and the tooth was banded to receive a lower canine retraction section for root positioning.

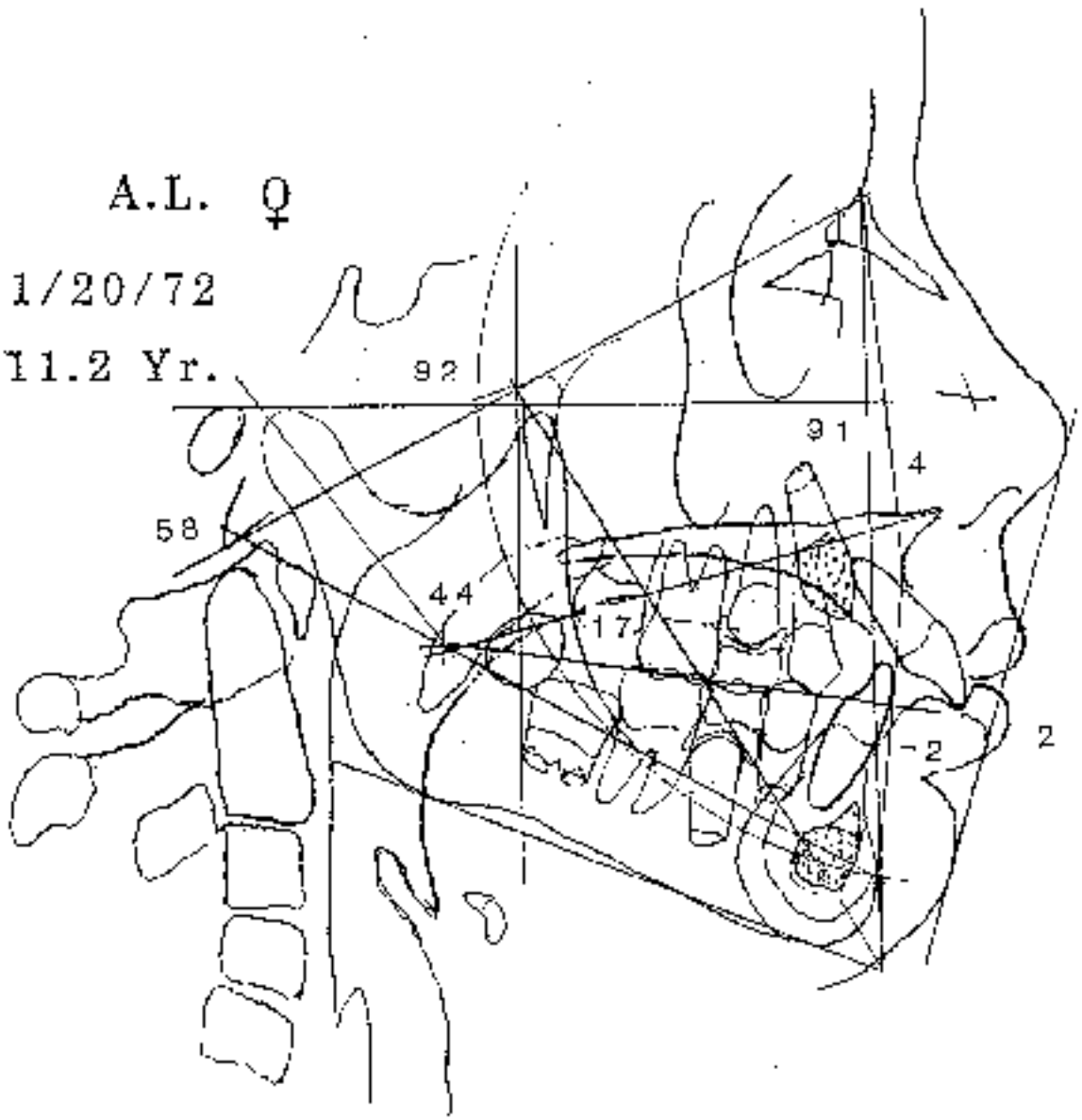
The upper canines, with advancement from the molars, corrected their inclination and erupted safely.

As the permanent teeth erupted, a full strap up was placed. Sectional mechanics was employed in order to overtreat the buccal segments and correct the midlines to each other. Transverse elastics were employed for obtaining arch agreement.

The patient erupted all third molars uneventfully and was quite stable with 32 teeth thereafter.

Comments

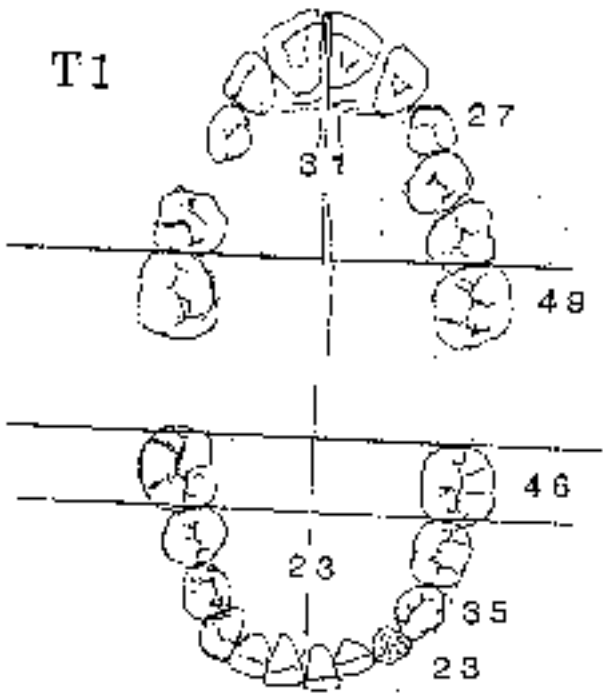
This patient demonstrates the advantage of light pressure. Only one ounce of force was needed to move the tooth crown about 2 centimeters.



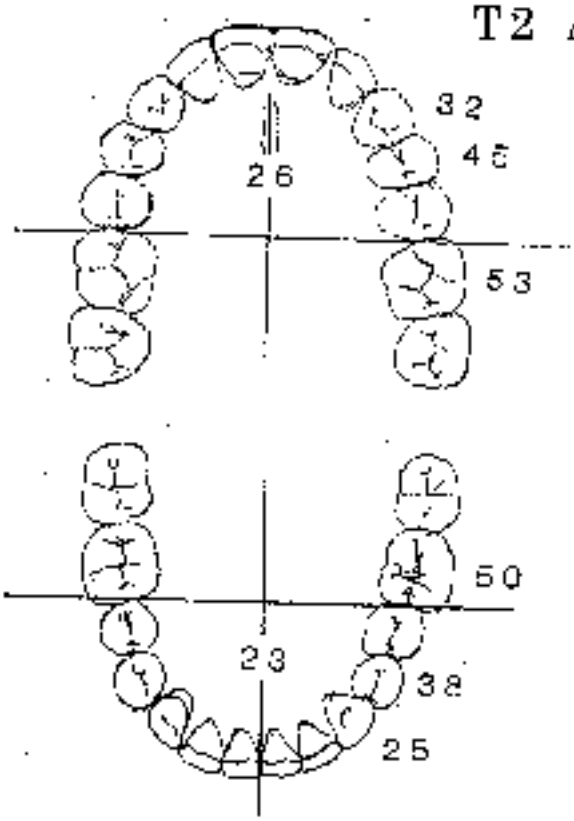
A female with three impacted canine teeth. The uppers and the lower left which drifted across the midline Brachyfacial pattern does not warrant a headgear. Not large symphysis and bimaxillary prognathism.

FIG. 10-9-I

A.L. T1

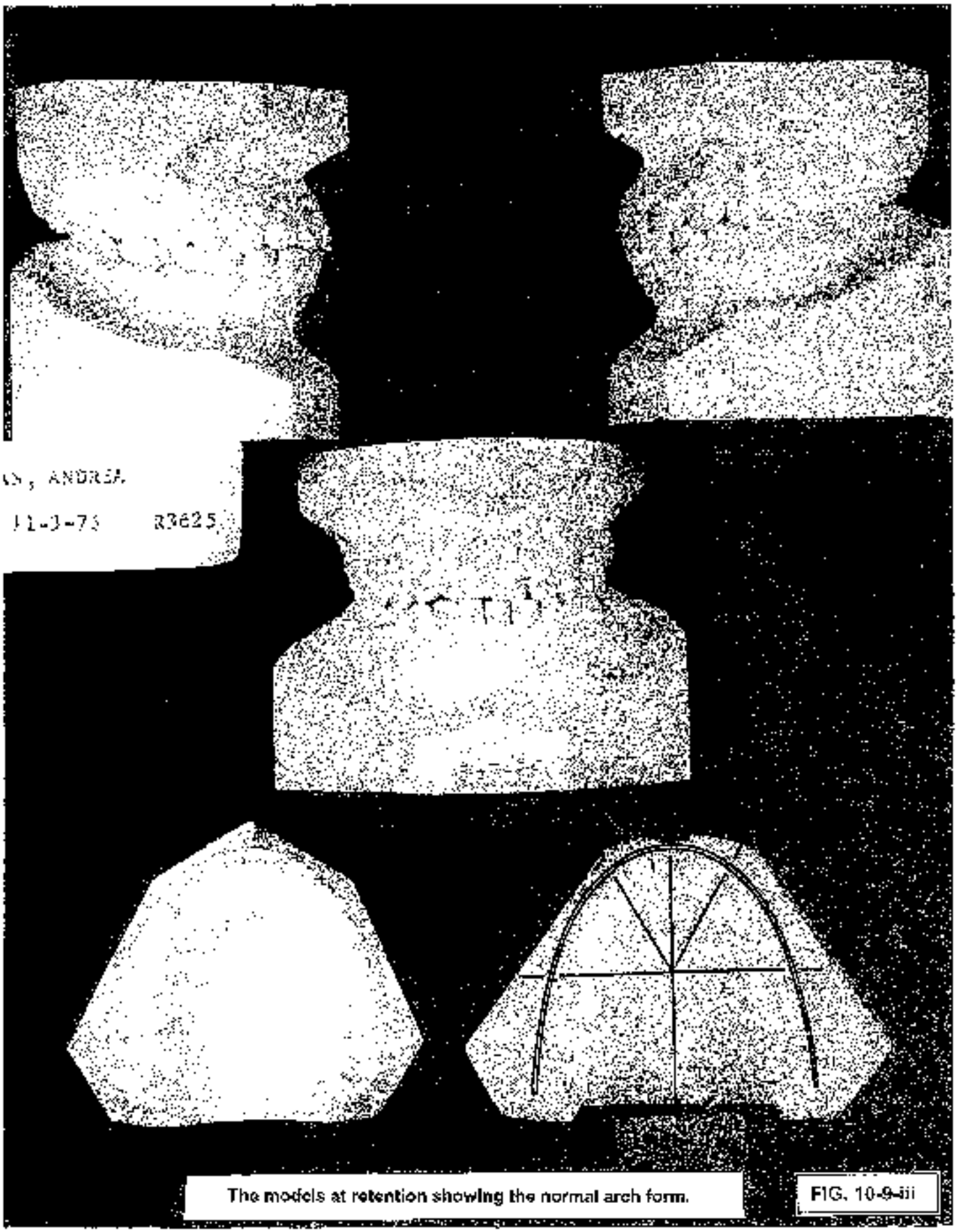


T2 A.L.



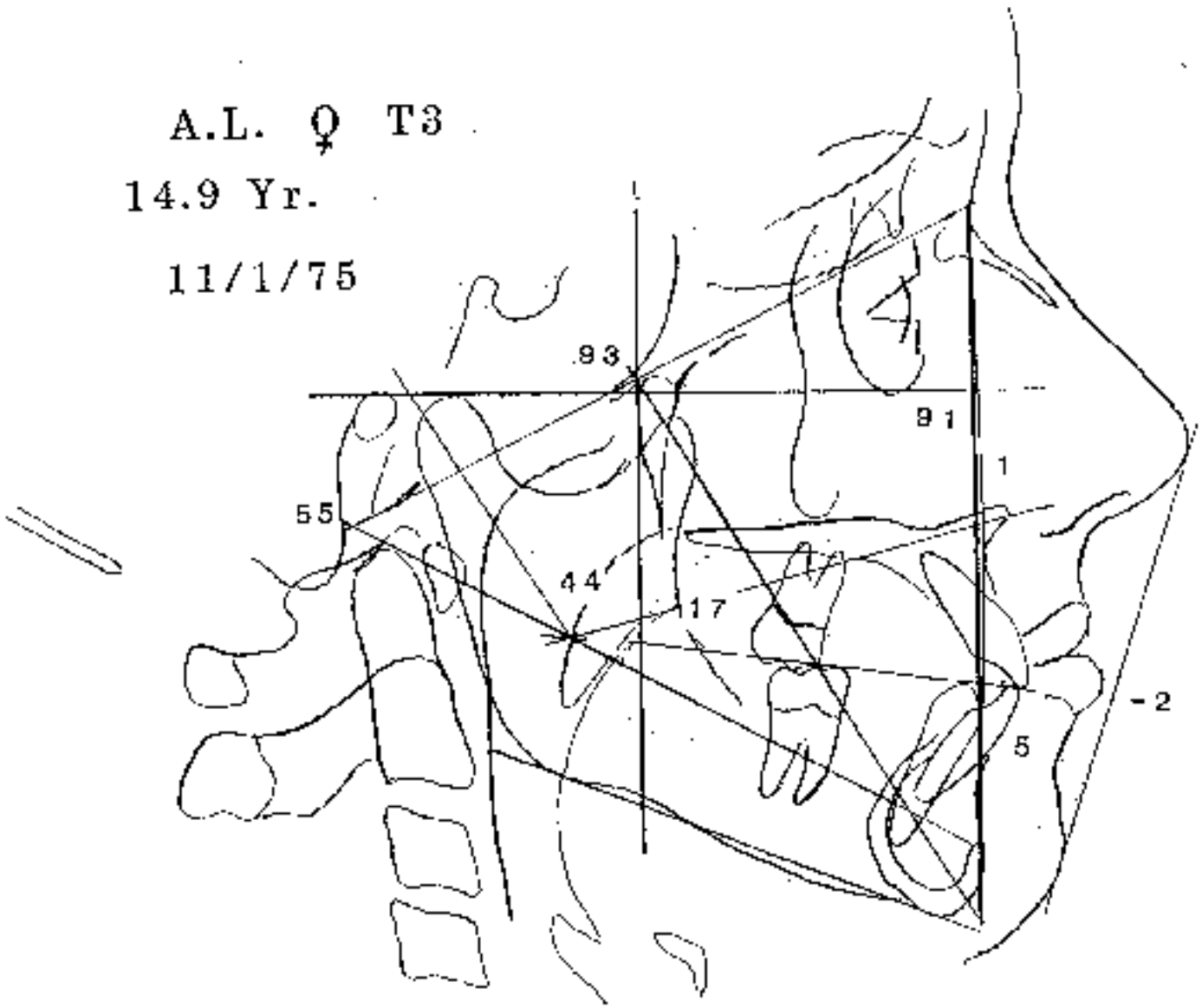
Note the lower left deciduous canine still in place (dotted). Note the difference in the untreated T1 and the treated T2 dimensions. Note the appropriate expansions.

FIG. 10-9-i



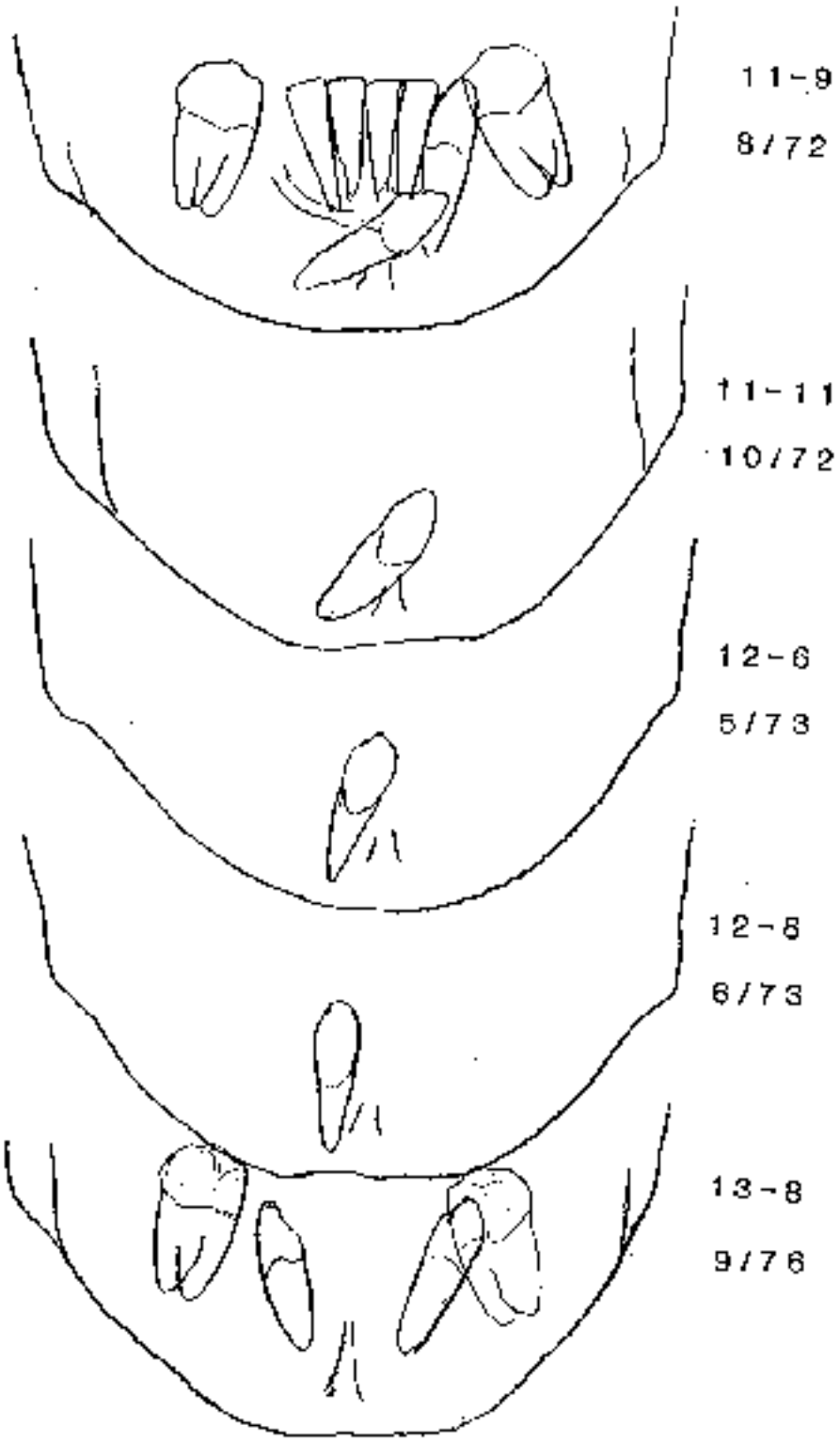
The models at retention showing the normal arch form.

FIG. 10-9-iii



The overtreated condition at T3 (at retention).

FIG. 10-9-iv

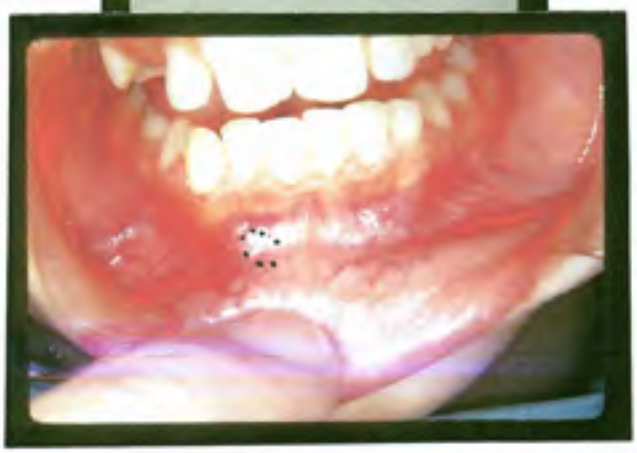


The progressive movement of the impacted canine as revealed in a series of frontal head films. Started in 8/72 and in place in 16 months. Total treatment four years.

FIG. 10-9-v

A

B



C

D

Case # 9 - 1

A

B

C

D

Case # 9 - 2

A

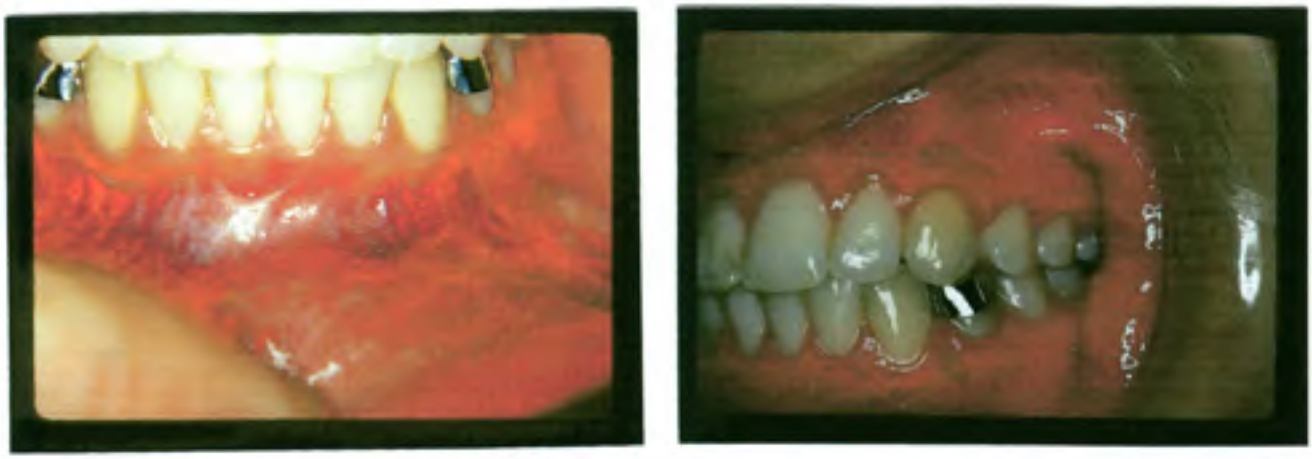
B

C

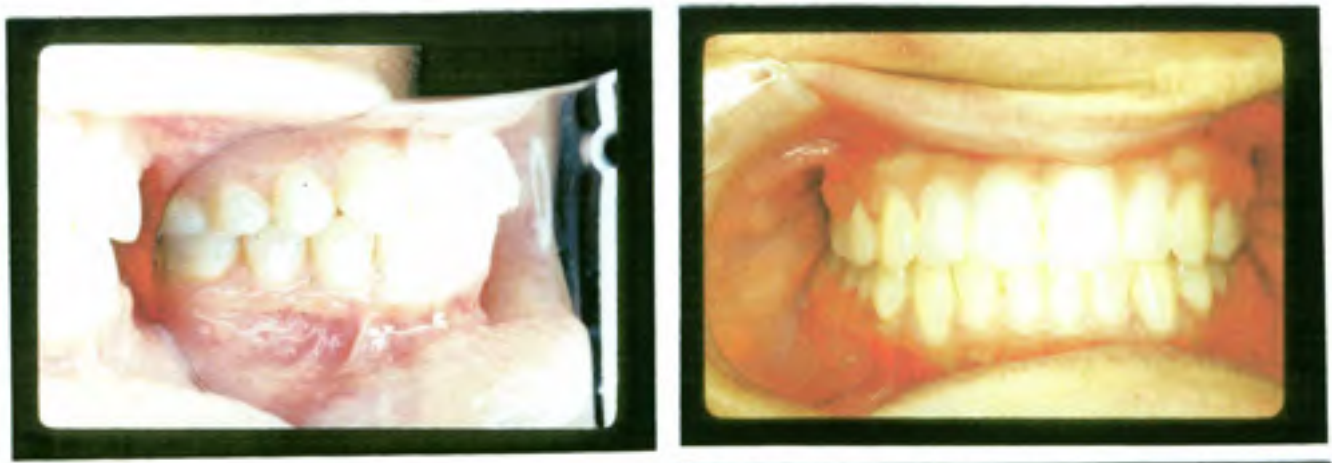
D

Case # 9 - 3

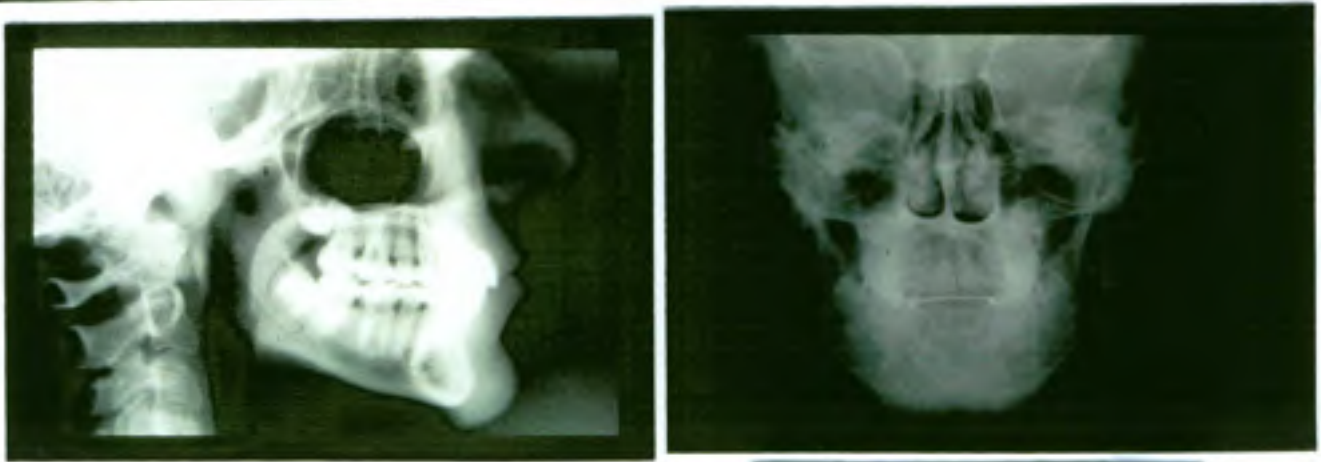
A



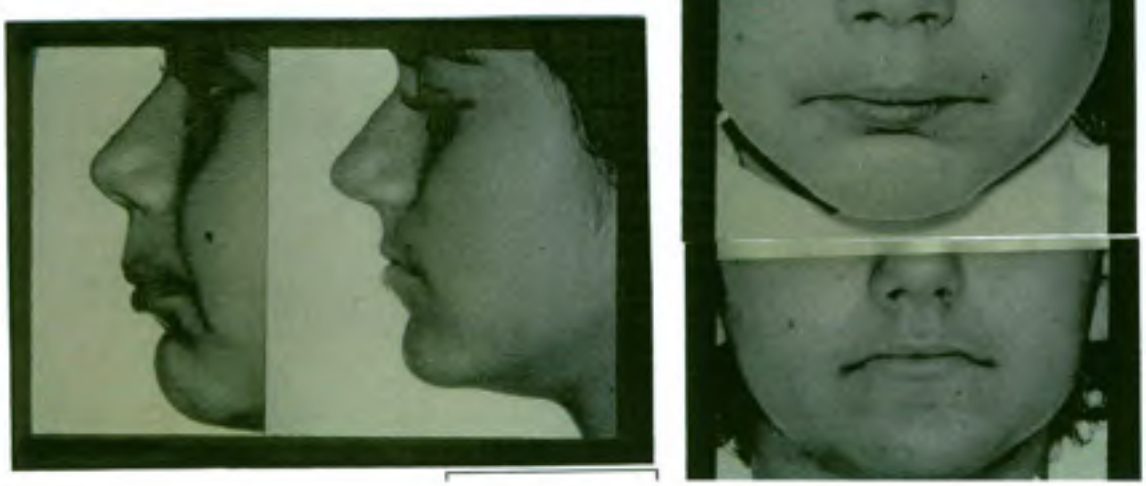
B



C



D



LEGENDS FOR CASE # 9

Case # 9 – 1 A.L. female with three impacted canines.

A. Note sublabial contraction at labio-mental fold. Note lower canine position in lateral film.

B. Note the position of the canine (dotted) and arch asymmetry. Note the VTO shows the need for a forward and downward movement of the lower incisors and significant distal movement of the upper incisors.

C. The roots of the lower incisors were moved lingually first. A flap was layed and the canine was exposed only on the distal 1/3. A channel was made with a bone bur for the path of movement of the canine. A thread was employed to move the canine directly laterally off a soldered bar of the lower arch.

D. The canine followed the path of the channal and was brought upward by long "boat loops" with .016" blue Elgiloy wire.

Case # 9 – 2

A. The facing (1/2 canine band) came off and the canine was banded and positioned by a lower extraction section. A double delta loop was employed for closing the space and canine rotation.

B. The upper canines emerged after advancement of the upper arch followed with straigh. wire.

C. Development of the buccal occlusion responded to intermaxillary traction.

D. The condition in a progress film and during idealization of the lower arch.

Case # 9 – 3

A. Ideal arches for coordination and overtreatment.

B. Progressive stripping and finishing arches.

C. Condition at retention in occlusal view.

D. Spaces for retainer are noted at the mesial of the canines.

Case # 9 – 4

A. The patient with a 4-4 retainer in the lower. Note the absence of recession.

B. The condition after retention.

C. All third molars erupted into functional occlusion. Note the nasal floor asymmetry and nasal asymmetry in D.

D. Profile view shows correction of sublabial groove. Frontal shows absence of lip strain.

VI. SUMMARY

Four groups of patients and nine children were shown in this lecture. The first group (of three) represented a variety of conditions treated in the deciduous dentition to include open bite, closed bite, Class II, Class III lingual cross bite and buccal cross bite. Treatment in long range proved the validity of the forecasts, the attainment of long range goals and the stability of treatment.

The second group (of two) represented severe Class II open bite and closed bite in which serial growth records preexisted prior to treatment. This demonstrated conclusively the stability of maxillary behavior in the absence of treatment which should not be argued. With extraoral traction on molars only, the findings show conclusively a change or alteration in maxillary characteristics.

The third group was patients with open bite, lingual cross bite, closed bite, and buccal cross bite in the mixed dentition.

The fourth group dealt with canine impaction, third molar enucleation and long term results with again the validation of the whole Determination - Resolution Process - and Therapeutic Regimes.

All these patients demonstrate the wisdom of progressive thinking which means the major problems are form and function and are addressed first at an age when correctable.

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