

# THE JOURNAL

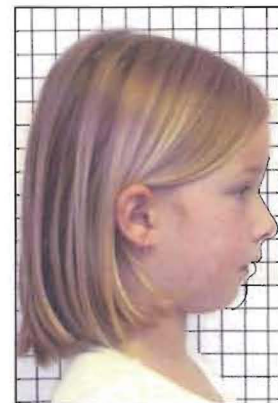
OF GNATHOLOGIC ORTHOPEDICS AND FACIAL ORTHOTROPICS

DEDICATED TO ADVANCING THE WIEBRECHT - CROZAT AND ORTHOTROPIC® PHILOSOPHIES

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## *Treatment of an Anterior Crossbite with Moderate Crowding*



### *Orthotropic Treatment*



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## CASE REPORT

### *Comprehensive Phase I and II Treatment of a 7-year old Male Skeletal Class III Tendency, Anterior Crossbite with Moderate Crowding Using Straight Wire Appliance Mechanics*

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#### Learning Objectives:

- *Diagnosis and treatment planning with supernumerary teeth*
- *Early management of anterior rotations and crossbites of the permanent teeth*
- *Management of airway issues: gagging, allergic rhinitis, nasal congestion*
- *Management of poor oral hygiene and partial cooperation*
- *Common Sense Mechanics by Dr. Thomas Mulligan*

#### CHIEF DENTAL COMPLAINT

The patient stated, "I don't like my crooked teeth. My teachers keep asking me when I am going to get braces to fix my teeth."

#### HISTORY

The patient had a natural, full term birth. He was nursed exclusively for the first month of life and after that he was fed breastmilk and milk-based formula. He was in the 90th percentile for height and weight. He had mild allergies to pollen and dust as a child and took children's Claritin as needed to control symptoms. He had frequent colds in the winter during the time of orthodontic treatment which improved as he got older. The cephalometric x-ray showed a large 13mm posterior airway space (average 10-11 mm, measured from the distance from the back of the tongue to the back of the throat) due to enlarged tonsils displacing the tongue forward. (Fig. 1)

The TMJ function was within normal limits, asymptomatic for clicking and not tender to palpation. Bruxism was negative.

Dentally, this patient had no caries on his permanent teeth despite the fact that his oral hygiene needed improvement at times. The patient had a hearty appetite for food and he was constantly eating and snacking.

#### ETIOLOGY

There was a 2 mm intra-arch mesiodens which caused the central incisor roots to diverge. The upper central incisors were rotated 45 degrees and moderate crowding was evident on the panoramic x-ray (Fig. 2). However, in the primary dentition, the patient exhibited a well developed upper and lower arch form. There were primate spaces in the canine area and no apparent signs that his permanent teeth would develop into a challenging malocclusion a few years later. The midlines were coincident and the patient had no myofunctional problems and good oral posture most of the time. (Fig 3a, 3b, 3c Phase I pre-treatment photos)



*Figure 1 – Pre-treatment Lateral Cephalogram shows a 13mm posterior airway space (normal 10-11mm), large tonsils and adenoids. The large tonsils displace the tongue and lower jaw forward, making it appear the patient has an adequate airway. However, large grade 3 tonsils can be seen intraorally partially obstructing the airway and contributing to the patient's exaggerated gag reflex. Sassouni plus analysis of vertical anterior face height – chin at the 12 yr old line at age 6 indicates a vertical grower and development of a long face. Horizontal Class III skeletal and dental tendency is apparent on this headfilm.*

**DIAGNOSIS**

A 7.5 yr old male in early mixed dentition presented with a skeletal Class III tendency, dental Class I primary canines, and an anterior crossbite with rotated incisor teeth. The arch length and width appeared to be adequate to accommodate the erupting permanent teeth. The facial profile was convex with a vertical growth tendency. His oral posture was good with no mentalis muscle strain when the lips were closed.

**TREATMENT OBJECTIVES**

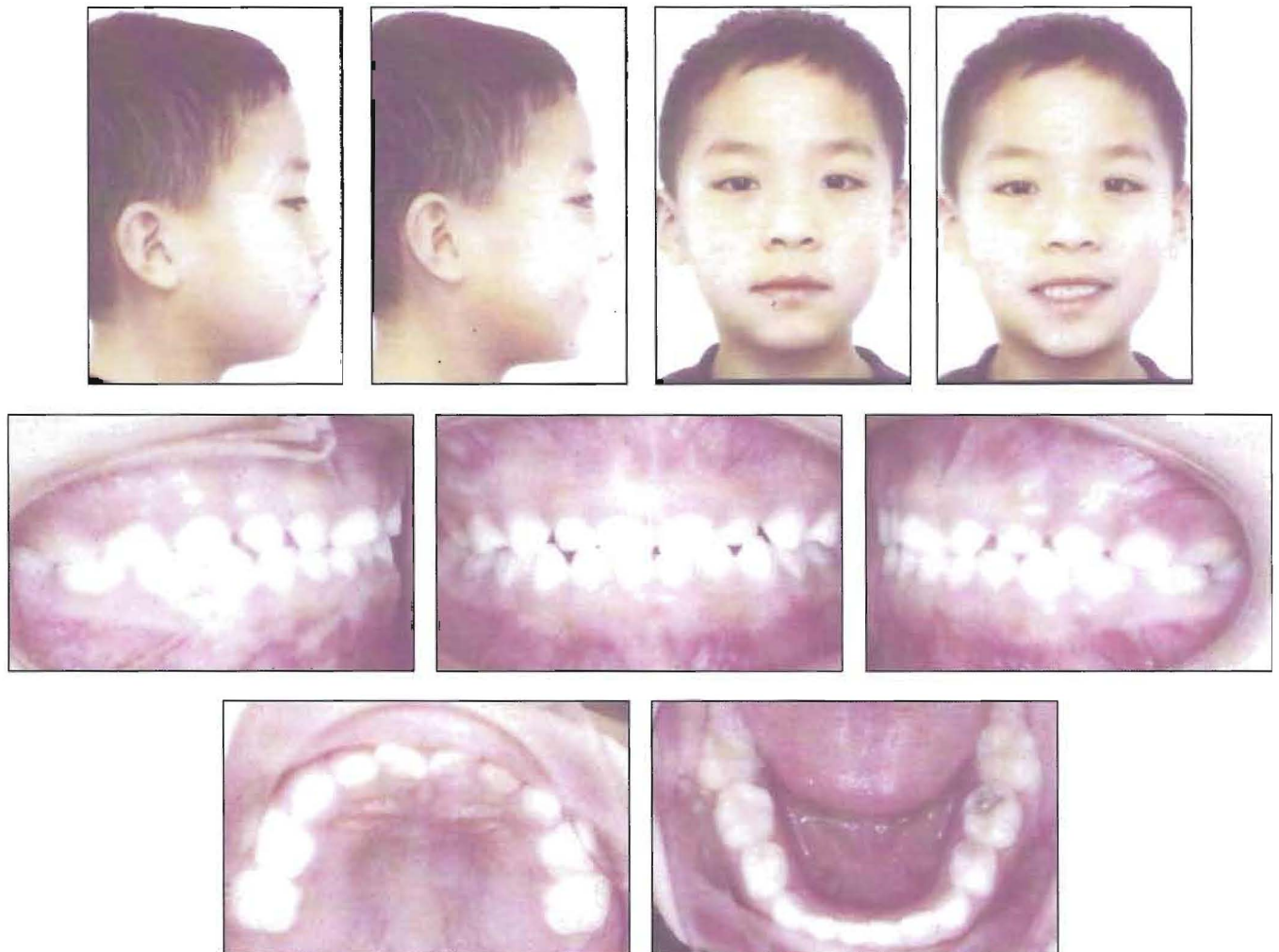
1. Surgically remove the mesiodens between the upper central incisors
2. Level and align the upper permanent central incisor teeth
3. Correct the anterior crossbite
4. Correct the centric occlusion and centric relation discrepancy, approximately 2mm
5. Monitor and guide eruption of the remaining permanent teeth

6. Rest period after Phase I active treatment

7. Retain arch length and width for as long as possible with an upper Invisaitain retainer and fixed lower lingual arch.



*Figure 2 – Pre-treatment Panorex. The upper and lower canines are impacted, a large diastema and rotations are evident between the upper permanent central incisors and supernumerary teeth incisal to upper left central incisor and adjacent to the lower right permanent canine.*



*Figure 3a – Pre-treatment Phase I Photograph Series*

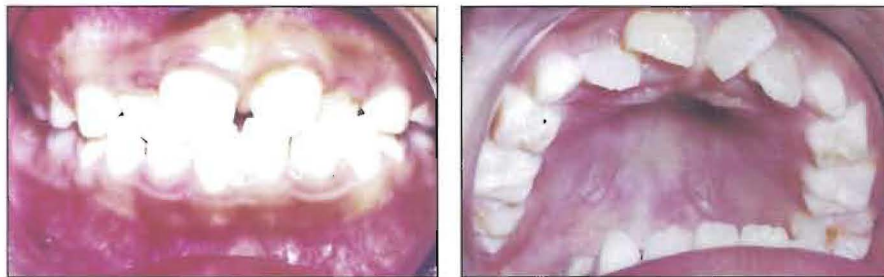
**APPLIANCES AND TREATMENT PLAN**

Teeth # 8 and #9 were initially bracketed for leveling and alignment. (fig 4a and 4b) A removable Hawley occlusal plate was used to open the bite to allow for crossbite correction (fig 4c). The upper left lateral incisor was bracketed on the lingual with a penguin elastic to lasso the tooth after diastema closure (figs 4d and 4e).

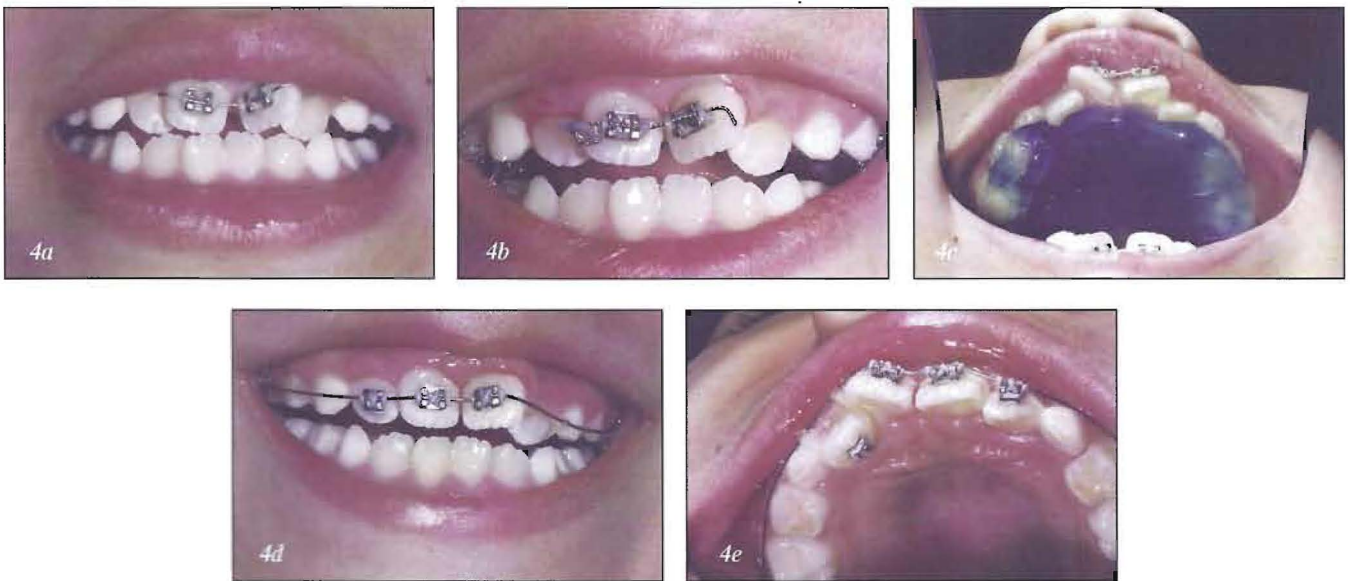
When the crossbite was corrected, #10 was rebracketed facially with the .022 Roth prescription bracket placed upside down for increased root torque. (fig 5).

A 2 x 4 partial strap up was used to complete leveling and aligning the four upper and lower incisors (fig 6).

Bands and brackets were removed 8 months later. (fig 7). The patient was instructed to wear an invisitaain upper retainer nightly and a lower lingual arch was cemented to hold arch length . The parents were informed Phase II treatment if permanent teeth should erupt unfavorably. The for minor tooth alignment and midline corrections after all the permanent teeth erupt and after the Phase I finish records are evaluated. This is the standard informed consent



Figures 3b and 3c – Phase I pre-treatment crossbite photos



Figures 4a - 4e – (a) Phase I , initial wire .016CN, (b) Phase I, light twisted steel wire, 2 loop chain elastic, (c) Phase I, occlusal view of bite plate and bracketed teeth, (d) Phase I, teeth are leveling and straightening, (e) Phase I, #10 bonded lingually and elastic to lasso tooth



Figure 5 – #10 bracketed on the facial upside down for increased root



Figure 6 – Upper and lower teeth are level, overbite and overjet



Figure 7 – Phase I finish, brackets removed, moderate gingivitis

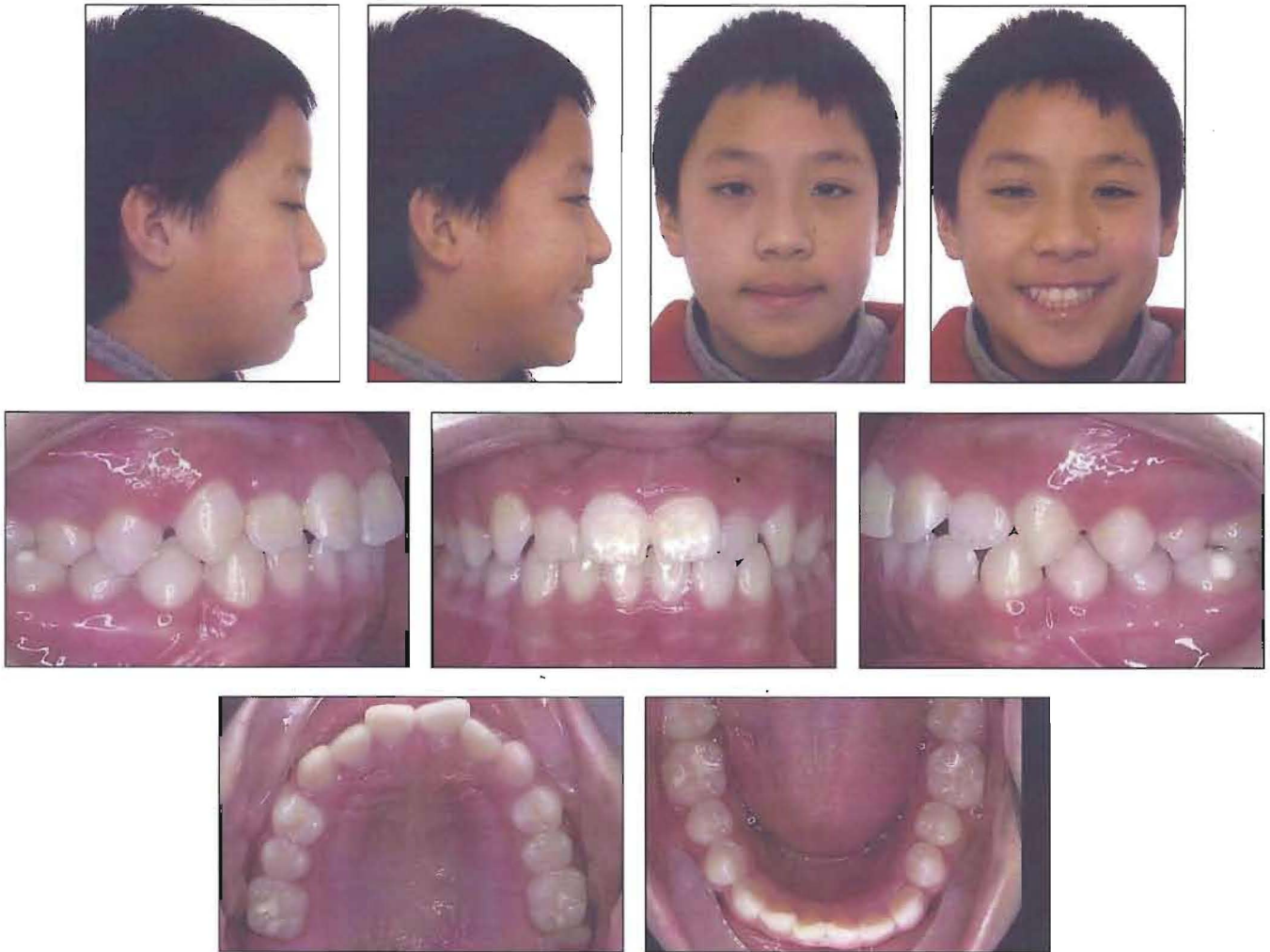


Figure 8a – Phase II Pre-treatment Photographs

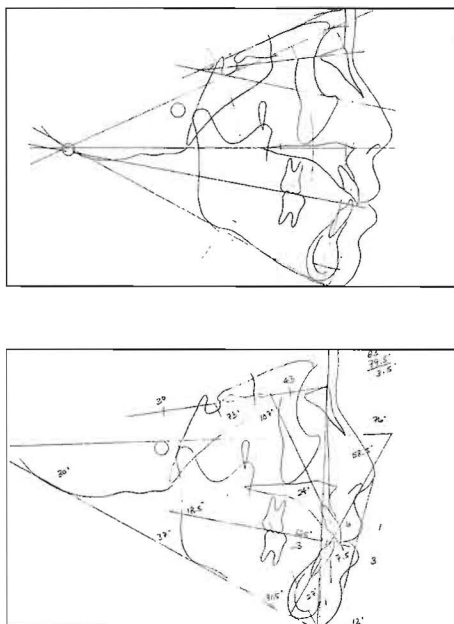


Figure 8b – Cephalometrics

		Ref. Norm.	
SNA	(angle)	82°	82°
SNB	(angle)	80°	79.5°
ANB	(angle)	2°	3.5°
SND	(angle)	76°	76°
I to NA	(mm)	4 mm	6
I to NA	(angle)	22°	24°
I to NB	(mm)	4 mm	7.5
I to NB	(angle)	25°	27°
Po to NB	(mm)	Not Established	1
Po & I to NB	(Difference)	Varies	6.5
I to I'	(angle)	131°	125°
Occl to SN	(angle)	34°	18.5°
GoGn to SN	(angle)	32°	37°
SL	(mm)	51	43
SE	(mm)	22	30
Soft tissue line	(ANGLE)		12°
AO-BO (WITS)			-3
I to SN			107°
Y AXIS			73°
		TWEED ANALYSIS	
		Ref. Norm.	
FMA		25°	30°
IMPA		90°	91.5°
FMIA		65°	58.5°

Figure 8c – Phase II, Pre-treatment Steiner and Tweed analysis

protocol for all Phase I patients and the additional fee for Phase II treatment has been discussed prior to case initiation and prior to case completion.

### PROGRESS OF TREATMENT

Prior to initiating orthodontic treatment, the mesiodens was surgically removed. The patient also has another supernumerary tooth on the lower right premolar area which his parents elected to observe.

After eruption of the central and lateral incisors, upper and lower impressions were made for study models and sent to the lab for fabrication of a Hawley bite plate to open the bite and unlock the anterior teeth from the crossbite. The patient wore the bite plate full time with brackets placed on teeth #8 and #9 and a .016 Nickel Titanium sectional archwire. After 6 weeks, an .018 Nickel Titanium archwire was used and #7 was bracketed to the facial and #10 was bracketed lingually. A 4.5 oz elastic was used to lasso the tooth and effect facial tooth movement. After 2



Figure 8d – Phase II, Pre-treatment Lateral Cephalogram, Age 12



Figure 8e – Phase II, Pre-treatment Panorex, Age 12

weeks, tooth #10 was re-bracketed on the facial. In 4 months teeth #7, #8, #9, #10 were all aligned. Pericapical xrays taken on the upper incisors showed normal root morphology and no root resorption. The lower incisors were bracketed with an initial .016 CN (Copper Nitinol) round wire followed by an .016 stainless steel round wire with molar bands on #19 and #30. The upper archwire was removed twice for six week intervals during treatment to test for tooth stability. After 2 years of active treatment the brackets and bands were removed.

### RETENTION

An upper Invisaitain removable retainer and fixed lower lingual arch were used in between Phase I and Phase II treatments. The parents were informed the patient will be evaluated for Phase II treatment after all the permanent teeth erupt and after the Phase I finish records are evaluated. This is the standard informed consent protocol for all Phase I patients and the additional fee for Phase II treatment has been discussed prior to case initiation and prior to case completion.

### FINAL EVALUATION AT THE END OF PHASE I

Rotated teeth can be corrected with straight wire appliances provided there is enough space and the arches are decompensated first. Treatment started on 8/16/2000 with 2 brackets and an anterior crossbite. An esthetic result was achieved in 4 months with the 4 upper permanent incisors in alignment and anterior crossbite completely corrected.

To minimize relapse, the patient was in active Phase I treatment for 2 years with partial fixed appliances due to minimal cooperation and severity of teeth rotations. The upper archwires were removed twice at 6 week intervals to test for tooth stability before the Phase I was finished.

### PHASE II TREATMENT OBJECTIVES

The major goals of Phase II treatment were to over-rotate the central incisors to control relapse, finesse the occlusion, place teeth in the neutral zone, and retain the teeth. The central incisors relapsed by 20 degrees due to lack of cooperation in wearing the removable retainer at the end of Phase I. (figs 8a, 8b, 8c Beginning Phase II records)

### PHASE II TREATMENT PLAN

A non-extraction, Phase II Treatment approach using straight wire appliances started when the patient was 12 years old. The patient was in active treatment for 15 months. Orthodontic visits were scheduled at 4-6 week intervals. Oral hygiene and cooperation were acceptable.



Figure 9 – Phase II, bands and brackets on



Figure 10 – Phase II, upper archform alignment, 17 x 25 CN wire



Figure 11 – Phase II, lower archform progress, 17 x 25 CN wire



Figure 12a – Phase II finish photographs, Age 20, 8/28/2013

**TREATMENT PROGRESS**

December 29, 2004 Band all first molars and bracket all premolars, canines, incisors.  
 The upper initial archwire was a .014 Neo Sentalloy by GAC and the lower initial archwire was a .014 nickel titanium.  
 January 13, 2005 Rotation wedges on the distal wing of upper central incisor brackets.

March 1, 2005  
 April 15, 2005  
 May 2, 2005

Upper and lower .018 stainless steel round archwires  
 Chain elastic 2-2 , Upper 17 x 25 CN wire, Lower 18 x 25 SS wire  
 Ligation tie 3-3 to consolidate spacing, separators on mesial of 2nd molars  
 Band all 2nd molars. Lower arch .016 NiTi piggybacked on 18x25 SS

March 4, 2006      Ligature tie 3-3, removed premolar brackets due to ideal occlusion (fig 9)

Upper arch 17 x 25 SS and .016 CN piggyback (fig 10)

Lower arch 18 x 25 SS and .016 CN piggyback (fig 11)

June 24, 2006      Deband and remove brackets, impressions for Invisaitain retainers.

**RETENTION AND CASE ANALYSIS**

Upper and Lower Invisaitain Retainers were delivered on June 25, 2006 with instructions for full time wear except while eating and brushing for the first 2 years, then nighttime wear until the third molars were evaluated at age 17. Despite the patient stating that he stopped wearing his retainers several months after the case was completed, the teeth remained straight .

Final records were taken 7 years post retention at age 20 ( fig 12a-e). All four third molars were removed at age 17. The last photo was taken on May 2015, nine years post-treatment ( fig 13) .

Early two phase treatment in this case was effective and successful and proved to be the appropriate treatment protocol for this patient in terms of long term stability. There is about a 10% success rate of straight teeth without long-term, indefinite retention.

**DEDICATION**

Expediently effective treatment of this case would not be possible without the instruction and mentorship of Thomas Mulligan, DDS, who challenged me and all his students to ask “the why?”. My 20 year journey of learning with Drs. Jack and Brian Hockel and the members of the American Academy of Gnathologic Orthopedics have been the best, most rewarding years of my career in dentistry.



Figure 12b – Phase II finish cephalogram, large posterior airway space

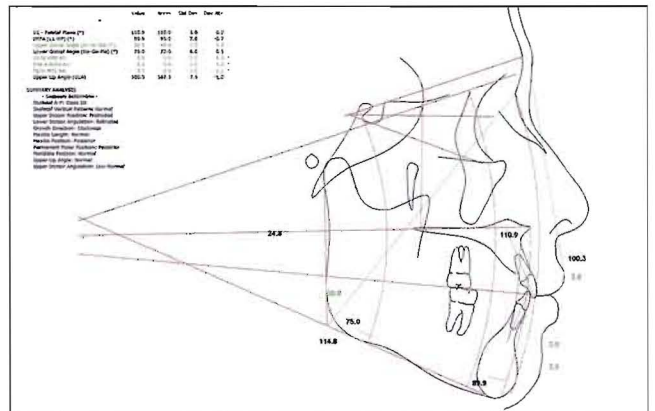


Figure 12c – Phase II finish ceph tracing and analysis



Figure 12d – Phase II finish panorex, all roots parallel, supernumerary tooth #28a



Figure 13 – Nine years post-treatment