



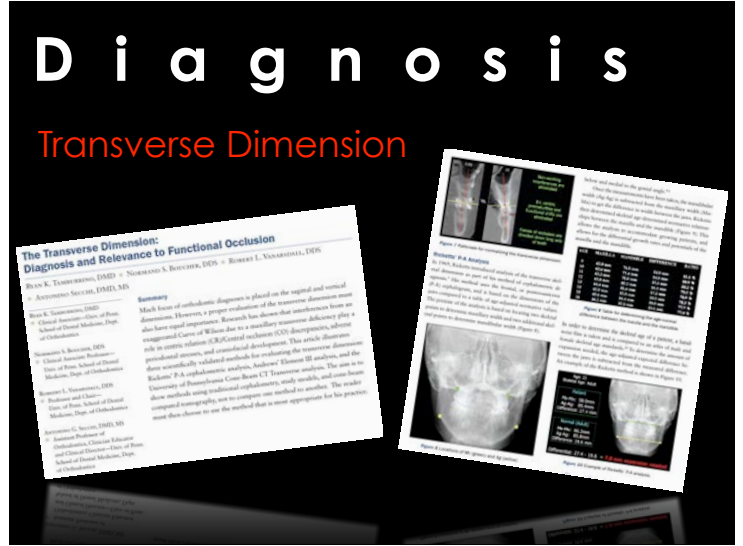
Skeletal Diagnosis and Treatment of the Transverse Dimension

Antonino G. Secchi, DMD, MS

Clinical Assistant Professor
Department of Orthodontics
University of Pennsylvania

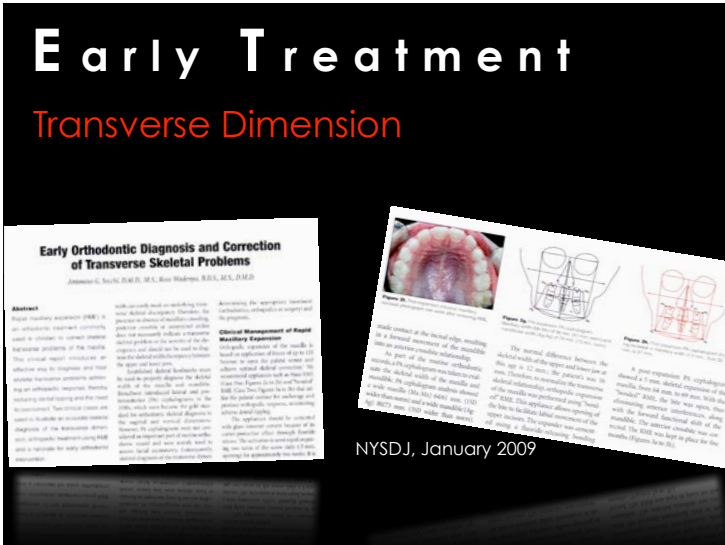
Diagnosis

Transverse Dimension



Early Treatment

Transverse Dimension



NYSDJ, January 2009

Early Treatment

Transverse Dimension

Vanarsdall, R.L., Kelly, K.A., Secchi, A.G.

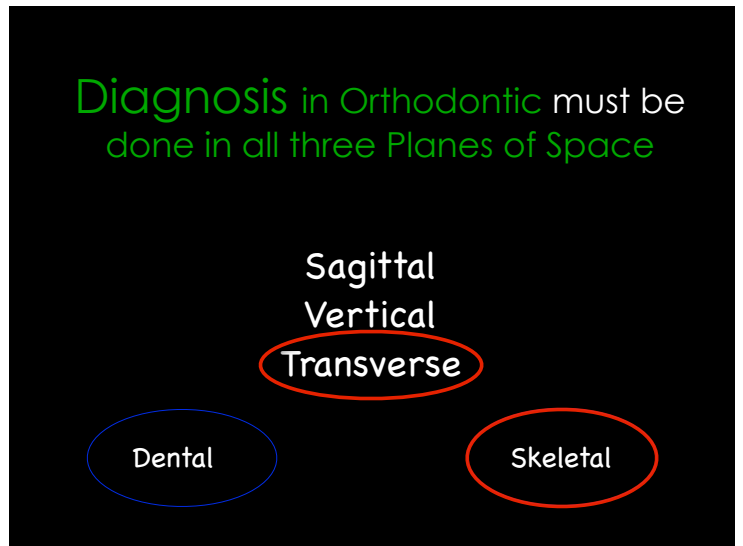
The Relationship between the Maxillary Impacted Canine and the Transverse Dimension.

Inf Orthod Kieferorthop 36:91-97, 2004.

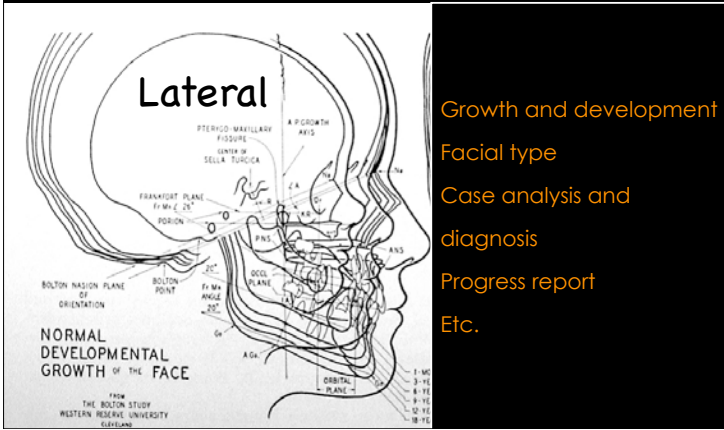
“Therefore, this study indicates that patients with maxillary impacted canines have a maxillary transverse skeletal deficiency that may be a contributing factor in causing canines to become palatally impacted”.

“A three-dimensional subject deserves three-dimensional treatment.”

McHorris
JCO, September 1979

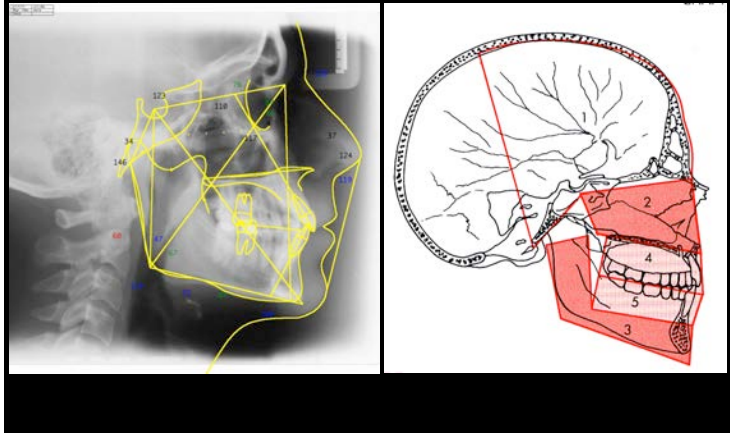


Broadbent introduced Cephalometric Radiography in 1930'



Growth and development
 Facial type
 Case analysis and diagnosis
 Progress report
 Etc.

Lateral Ceph Sagittal and Vertical



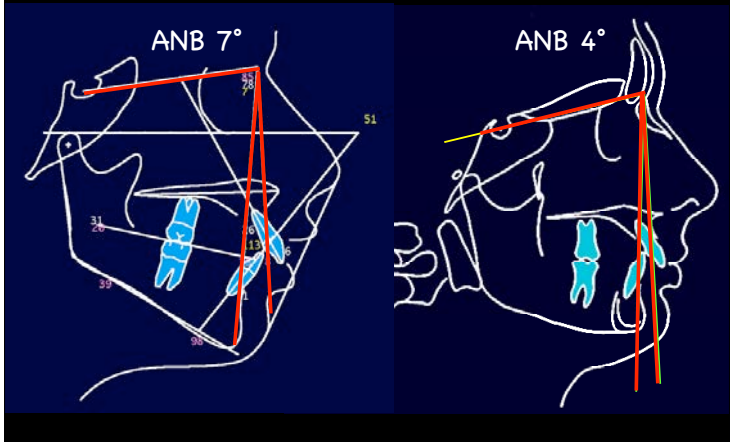
Same Overjet

Dental



Different ANB

Skeletal



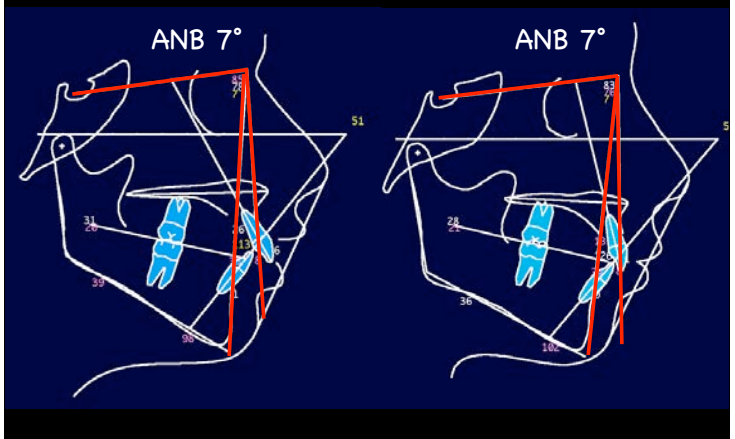
Different Overjet

Dental



Same ANB

Skeletal



Skeletal diagnosis must be done regardless

Dental compensations

Sagittal
Vertical
Transverse



Traditionally, in the Transverse...

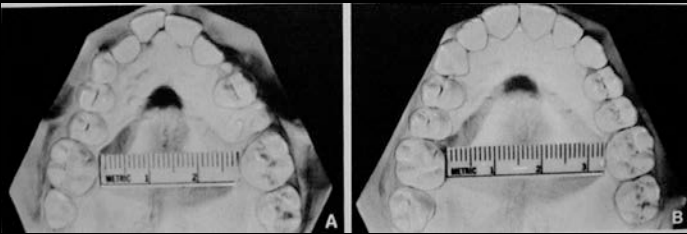
Crossbite



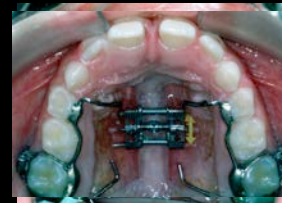
Taper Arch

Traditionally, in the Transverse...

Dental Arch Width



McNamara JA, Brudon WL
Orthodontic and Orthopedic Treatment in the Mixed Dentition, 1996



Rapid Palatal Expansion produces an orthopedic (skeletal) correction of the transverse dimension



Therefore it must be used based on a skeletal (not dental) diagnosis of the transverse dimension

~~Dental Diagnosis~~



~~Skeletal Correction~~

CLINICAL PRACTICE

COVER STORY

Evidence-based orthodontics for the 21st century

MARC ACKERMAN, D.M.D.

JADA, February 2004

-Malocclusion/Periodontal Disease

-Malocclusion/TMDs

-Rapid Palatal Expansion in the Absence of Crossbite

No value

CLINICAL PRACTICE

COVER STORY

Evidence-based orthodontics for the 21st century

MARC ACKERMAN, D.M.D.

JADA, February 2004

Bias-based orthodontics for the 21st century

Rapid palatal expansion in the absence of crossbites: Added value?

Anthony A. Gianelly, DMD, PhD, MD
Am J Ortho Dentofac Orthop 124(4), 2003

Dental

- RPE has traditionally been used to resolve crossbites
- Interest in RPE has increased
- Orthodontists using RPE might be seeking to gain arch perimeter to avoid extractions

Rapid palatal expansion in the absence of crossbites: Added value?

Anthony A. Gianelly, DMD, PhD, MD
Am J Ortho Dentofac Orthop 124(4), 2003

- In the absence of a crossbite, is RPE necessary to gain arch width to avoid extraction treatment?
- Is the maxillary arch perimeter the determinant in the extraction-nonextraction decision?

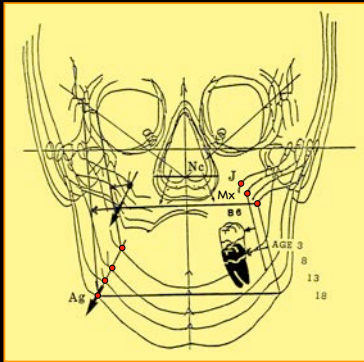
RPE has nothing to do with

- gaining arch perimeter
- extraction/non-extraction treatment

Skeletal Diagnosis

Transverse Dimension

The frontal reference points Mx-Mx and Ag-Ag were verified by Ricketts, and he chose them because of their proximity to the maxillary and mandibular molars.



Ricketts RM. Introducing computerized cephalometrics: Rocky Mountain Orthodontics; 1969.

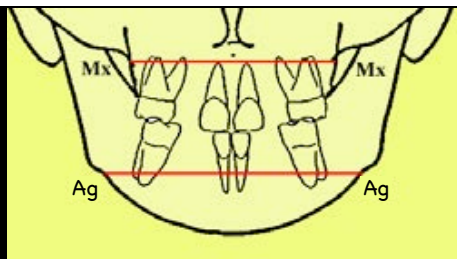
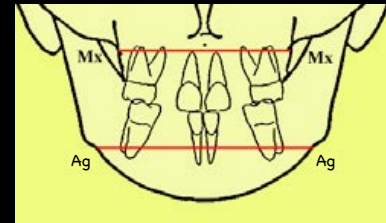
Bilateral Skeletal Landmarks

Maxillary Skeletal width: **Mx-Mx**

- **Mx**: a point located at the depth of the concavity of lateral maxillary contours, at the junction of maxilla and zygomatic buttress.

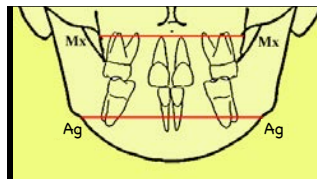
Mandibular Skeletal width: **Ag-Ag**

- **Ag**: innermost height of contour along curved outline of inferior mandibular border, below and medial to gonial angle.



Rocky Mountain Norms

AGE	MAXILLA	MANDIBLE	DIFFERENCE	RATIO
9	62.0 mm	76.0 mm	14.0 mm	81.6 %
10	62.6 mm	77.4 mm	14.8 mm	80.9 %
11	63.2 mm	78.8 mm	15.6 mm	80.2 %
12	63.8 mm	80.2 mm	16.4 mm	79.5 %
13	64.4 mm	81.6 mm	17.2 mm	78.9 %
14	65.0 mm	83.0 mm	18.0 mm	78.3 %
15	65.6 mm	84.4 mm	18.8 mm	77.7 %
16	66.2 mm	85.8 mm	19.6 mm	77.4 %



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16	66.2 mm	85.8 mm	19.6 mm	77.4 %

Patient

Mx-Mx=
Ag-Ag=
Dif= (Ag-Ag)-(Mx-Mx)

Norm

Mx-Mx=
Ag-Ag=
Dif= (Ag-Ag)-(Mx-Mx)

Norm Dif. - Patient Dif. = **Differential**
(negative number)

Does RPE provide a stable correction?

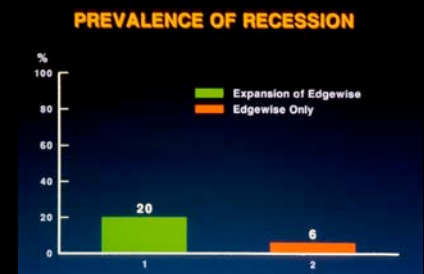
Does it have any effect on Periodontal health?

Rapid Palatal Expansion: Long term stability and periodontal implications

Herberger T. and Vanarsdall R.L.
Thesis 1987, Department of Orthodontics University of Pennsylvania

Results: Most stable dental and skeletal results over a longer period of time

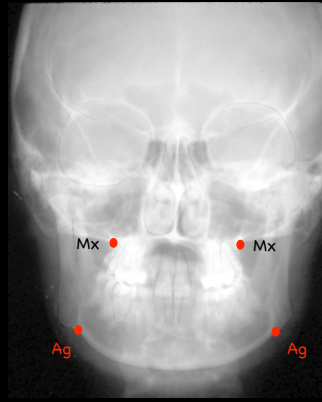
Potential Long Term Periodontal Effects



Expansion and evaluation of post-retention gingival recession

Anzilotti CL, Vanarsdall RL and Balakrishnan M
Thesis 2002, Department of Orthodontics, University of Pennsylvania

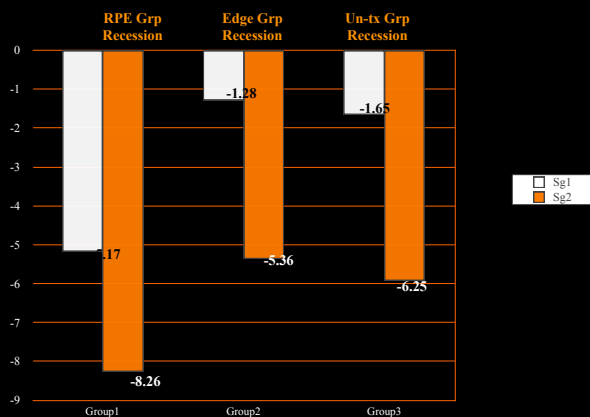
- Pre and post Tx models
- Pre and post Tx PA cephs
 - Compared maxillary to mandibular difference to RM norms adjusted for age-differentials larger than normal value expressed as negative number
 - Gingival recession – at least 2mm cemental exposure, at least on 1 posterior tooth



Materials and Methods

- Gp1 75pts – Haas RPE
 - T1-age 11.3 T2-age 20.7
- Gp2 22pts – edgewise only Tx
 - T1-age 12.3 T2-age 19.3
- Gp3 28 Untreated controls–University of Michigan
 - T2-age 17.2

Transverse Differentials From RM Norms



Orange Sub-groups exhibited recession

Conclusions

- All three groups revealed gingival recession.
- A negative transverse differential **>5mm** from RM norm may be a **risk marker** for periodontal disease.
- Data helps identify patients at greater risk.

Differential > 5mm



risk marker for
periodontal disease

Transverse Skeletal Dimension

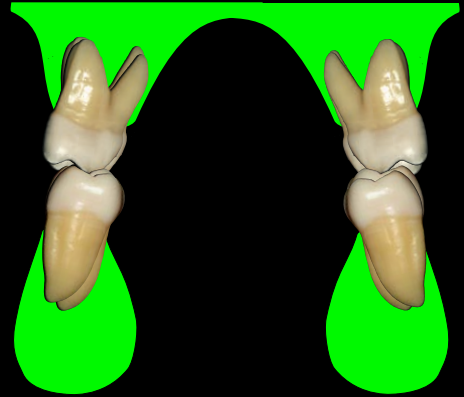
Maxilla

	Narrow	Normal	Wide
Narrow	✓	x	xx
Normal	x	✓	x
Wide	xx	x	✓

Mandible

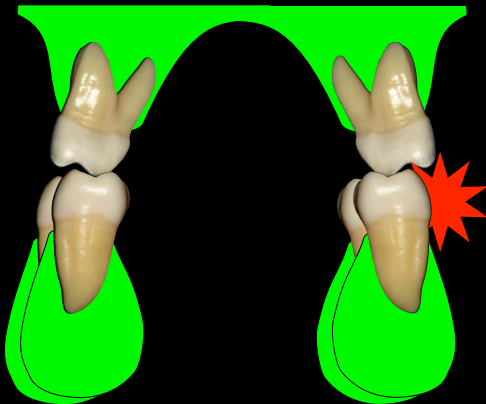
Consequences of Ignoring the Transverse Dimension

Dental Expansion and Function

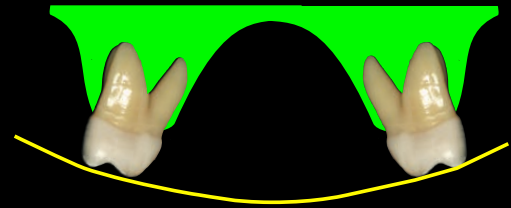


Ryan K. Tamburrino, DMD

Dental Expansion and Function



Dental Expansion and Function



Note the excessive **Curve of Wilson**
Non-working interferences are likely

Dental Expansion Only

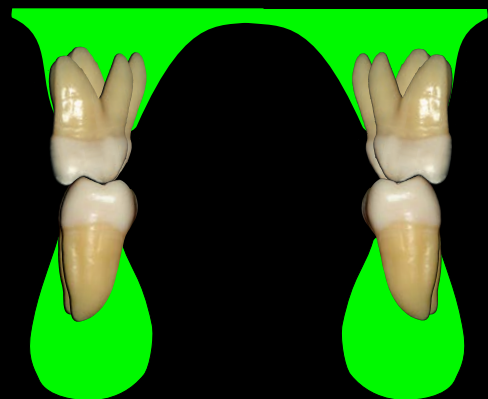


Expansion with **archwires**

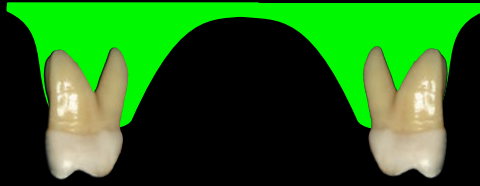


Note extreme **Curve of Wilson**
and "**plunging**" **palatal cusps**

Dental Expansion Only



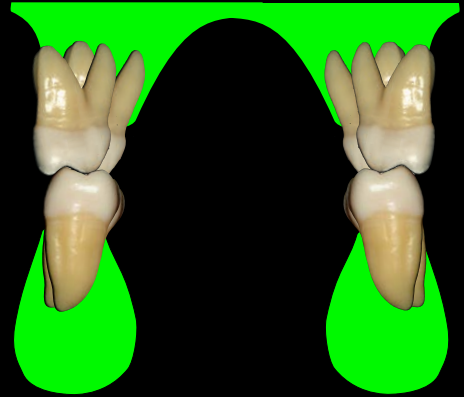
Dental Expansion Only



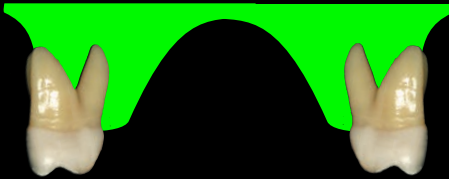
Dental expansion can cause thinning of the **cortical plate** and buccal **gingival unit**

A higher potential for attachment loss due to **normal mechanical abrasion** (toothbrushing) exists

Dental Expansion Only



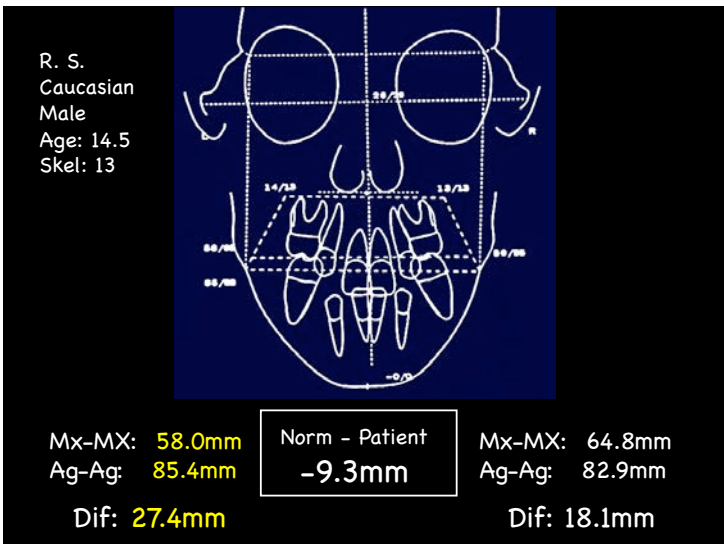
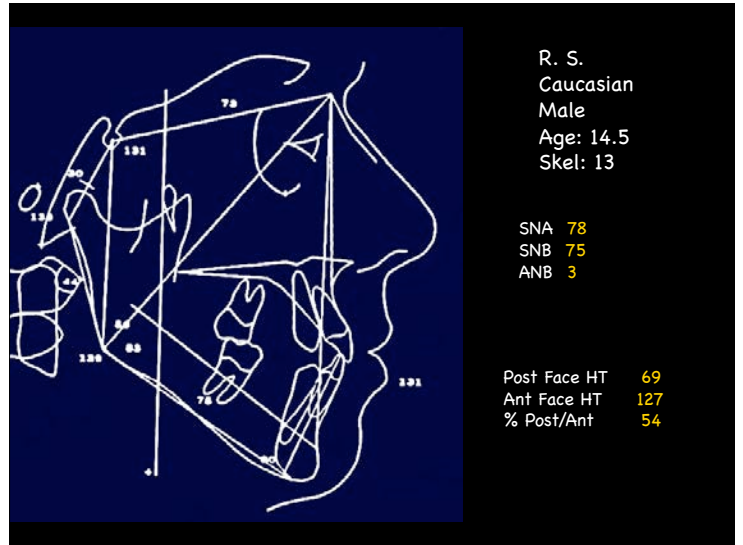
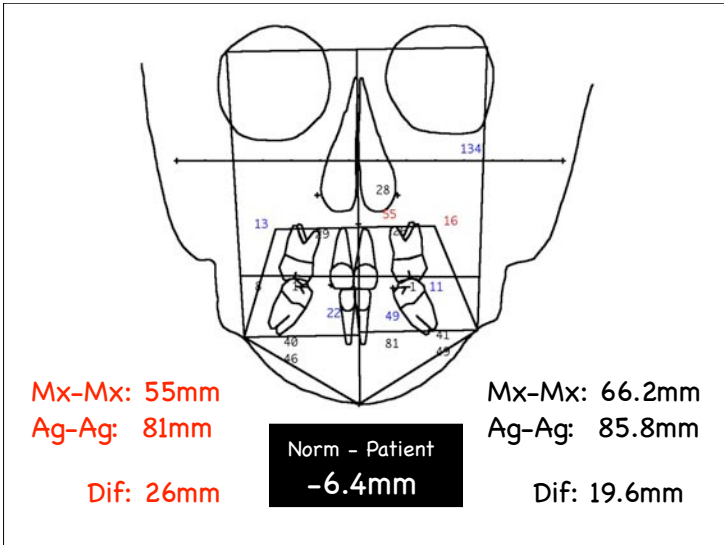
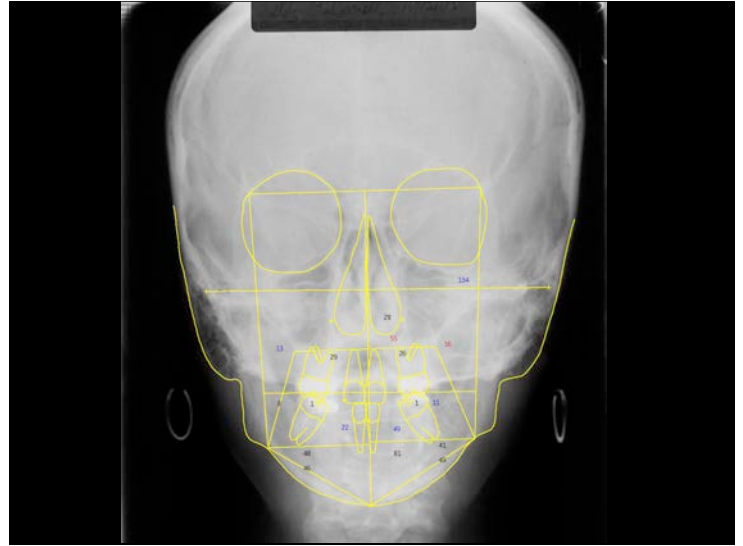
Dental Expansion Only

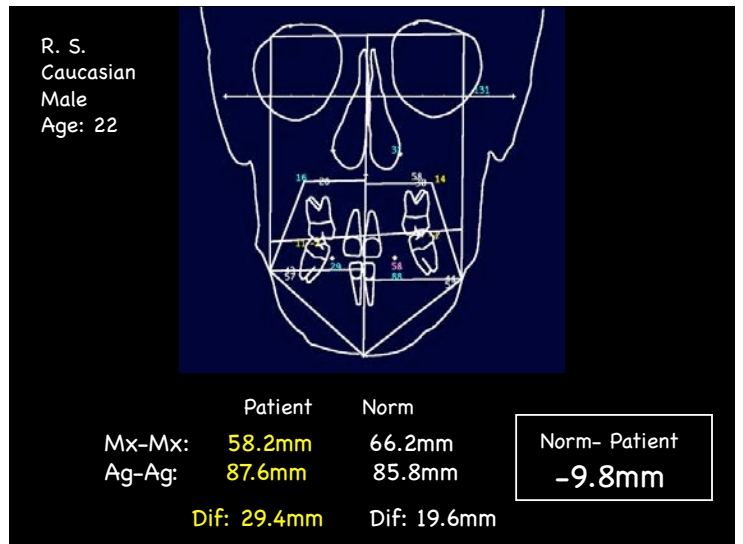
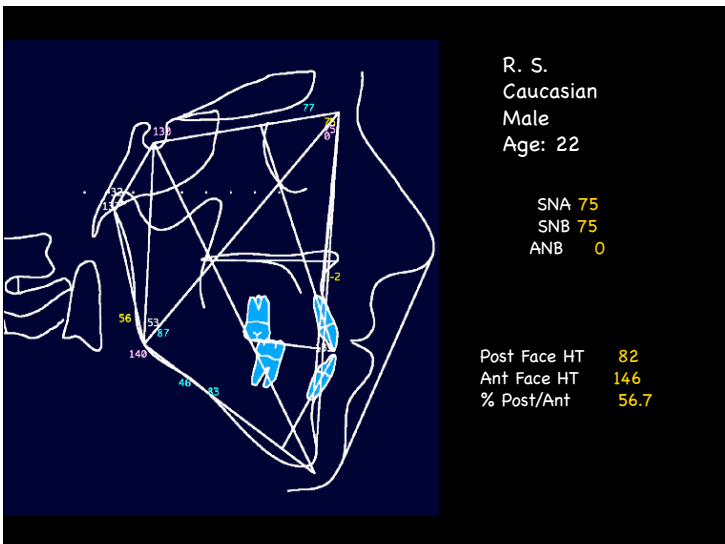
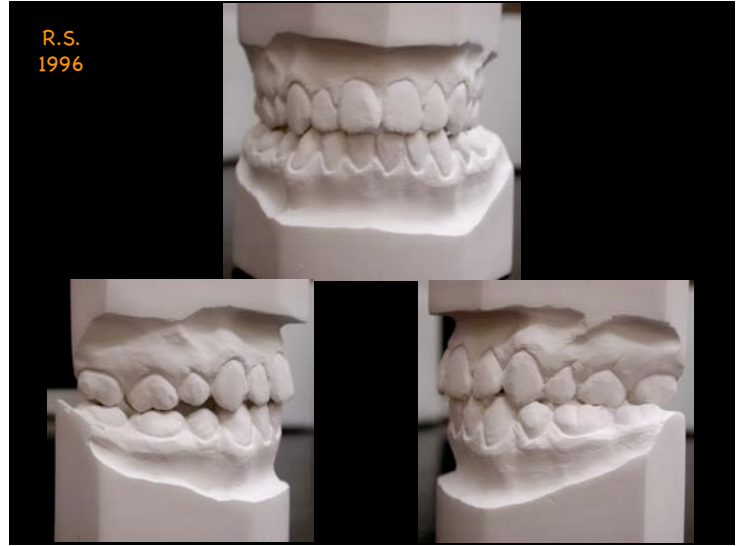


In severe cases, **fenestration** of the roots and attachment loss is possible

Kelly
36 yrs



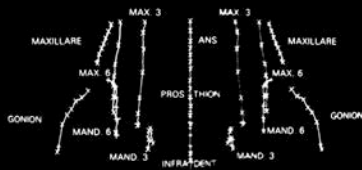




Transverse Dimensional Growth Slows First

Burlington template for the Transverse

AGES 4-6-8-10-12-14-17-20 YEARS



FRONTAL GROWTH PATTERN

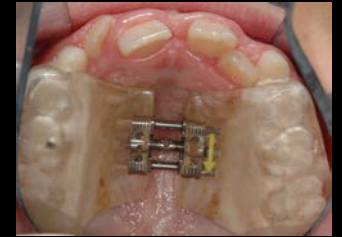
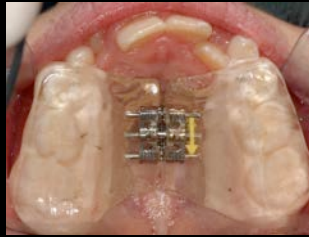
© 1977 THE GOVERNING COUNCIL
UNIVERSITY OF TORONTO
BURLINGTON GROWTH CENTRE

Bonded RPE

Before Activation



After Activation



Banded "Haas" RPE

Before Activation



After Activation



Banded "Haas" RPE Mixed Dentition

Before Activation



After Activation



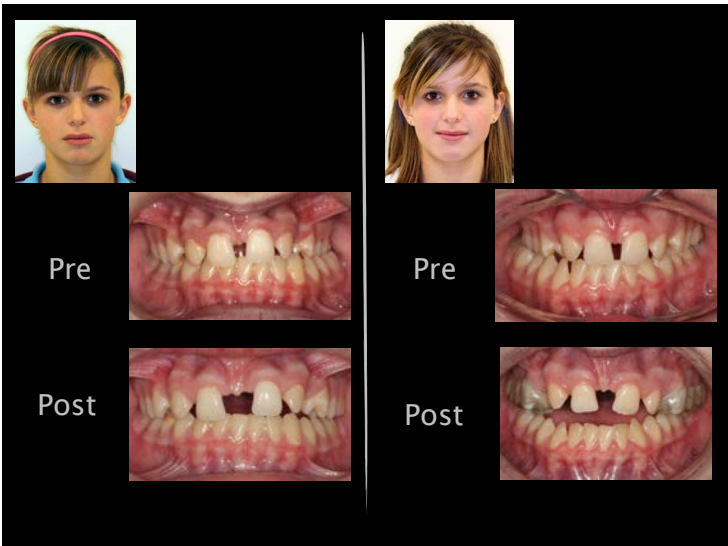
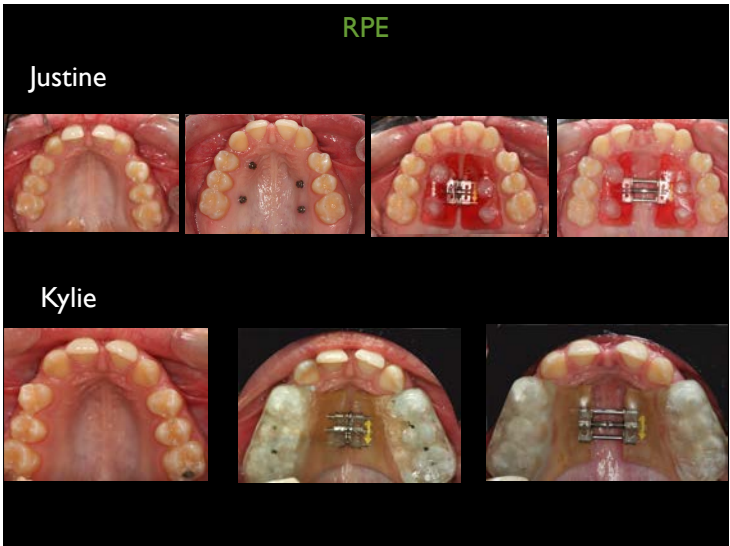
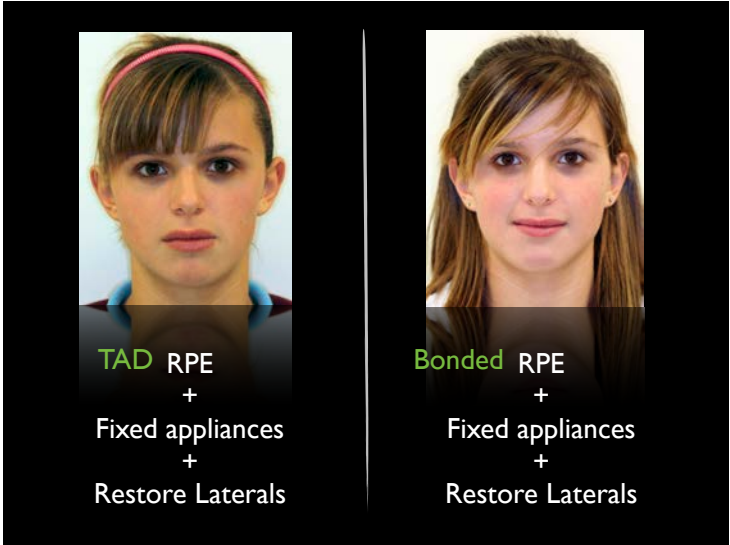
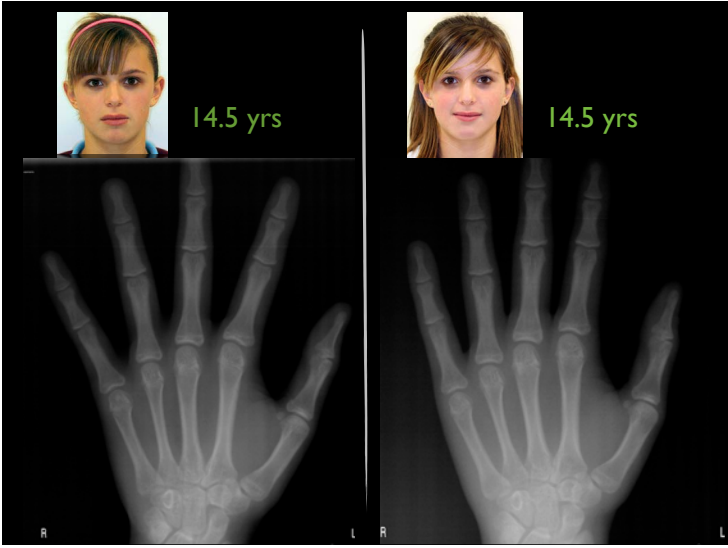
Hyrex RPE

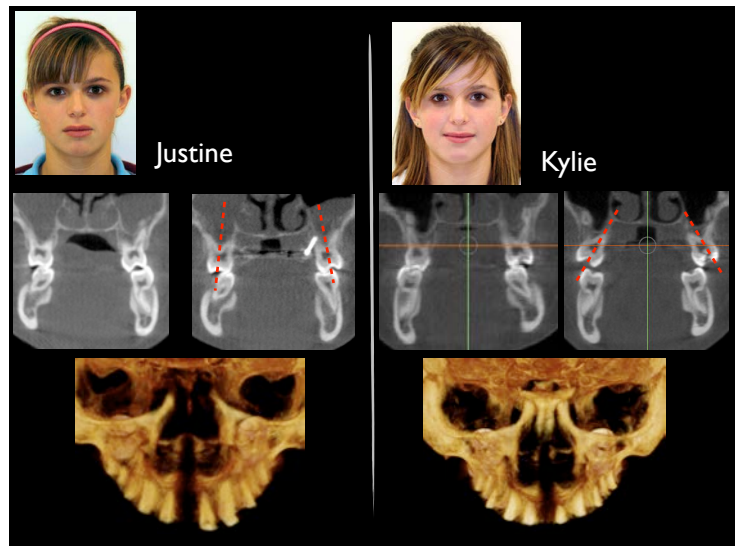
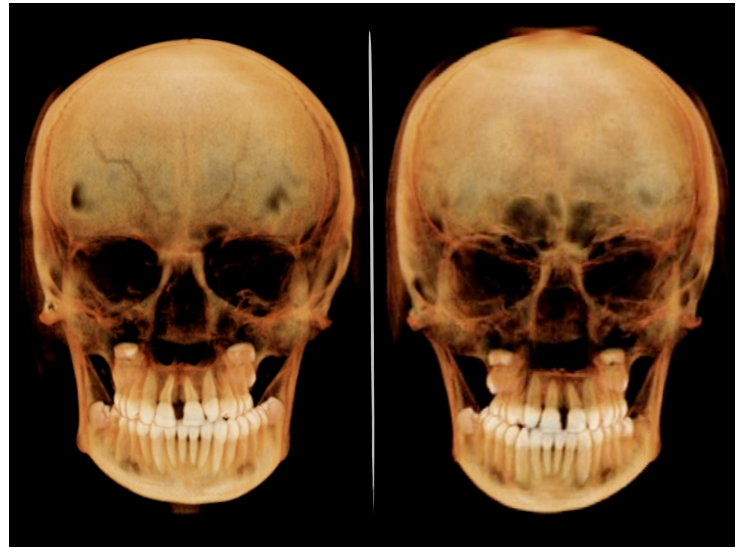


Tooth-Borne
cause too much tipping

Mini-implant supported RPE

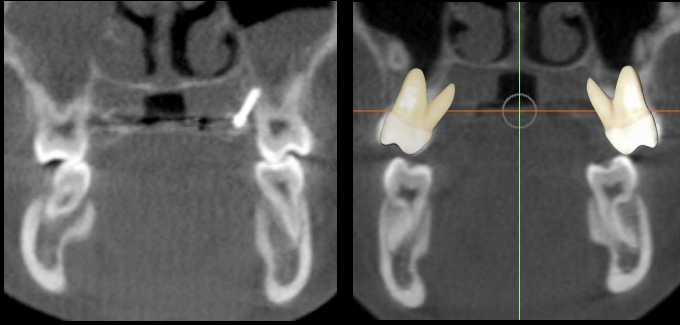




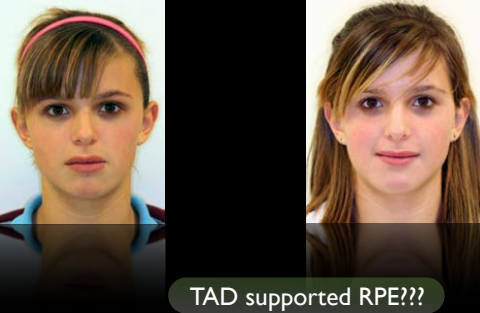


Coronal View

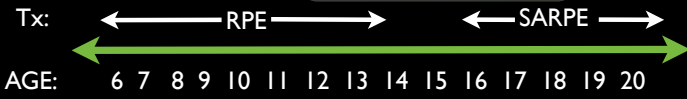
Decreased Orthopedic Effect. Increased Dental tipping.



Treatment Options



TAD supported RPE???



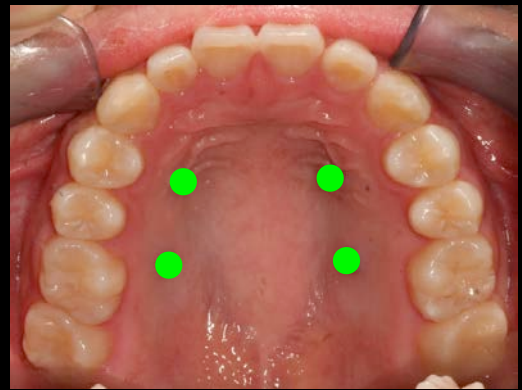
The TAD-Supported Haas Expander

Why Use a TAD-Supported Expander?



- Supports the palate for more effective expansion
- Minimizes tooth tipping and damage to the periodontium
- Allows for full bracketing at the time of expander placement
- Allows for sutural expansion of older adolescents?

Insertion of the TAD-Supported Expander



Placement of 4 TADs

Insertion of the TAD-Supported Expander



Placement of 4 TADs

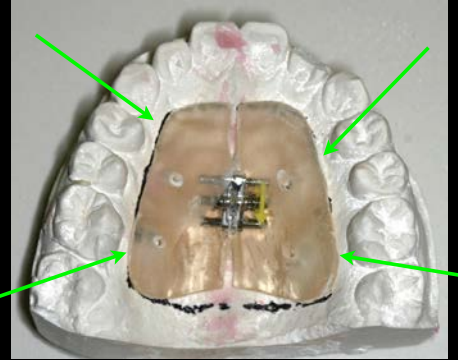
Insertion of the TAD-Supported Expander



Insertion of the TAD-Supported Expander



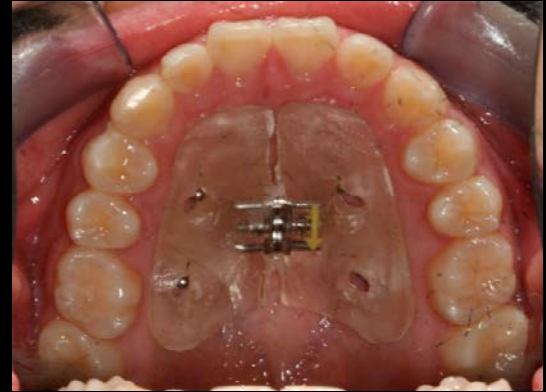
Insertion of the TAD-Supported Expander



Insertion of the TAD-Supported Expander



Insertion of the TAD-Supported Expander



Insertion of the TAD-Supported Expander



Insertion of the TAD-Supported Expander



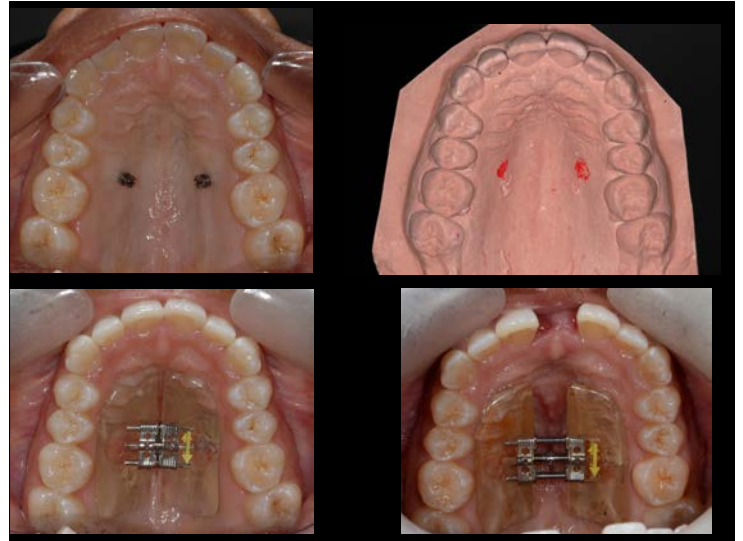
Insertion of the TAD-Supported Expander



Insertion of the TAD-Supported Expander

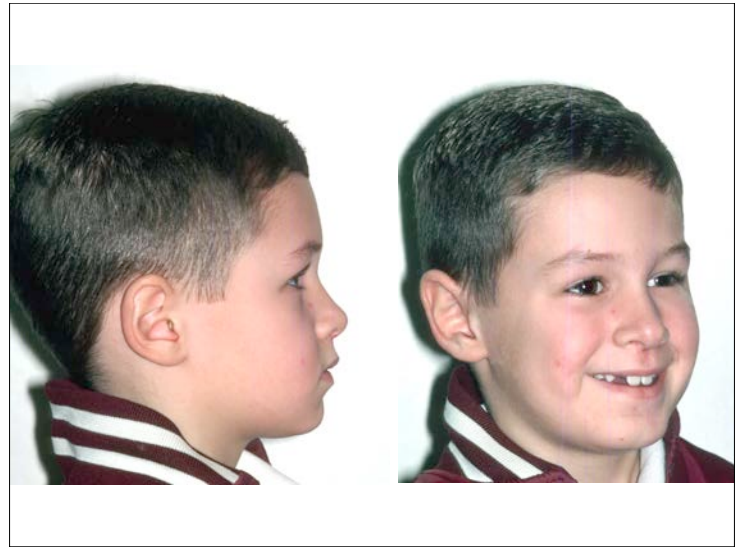
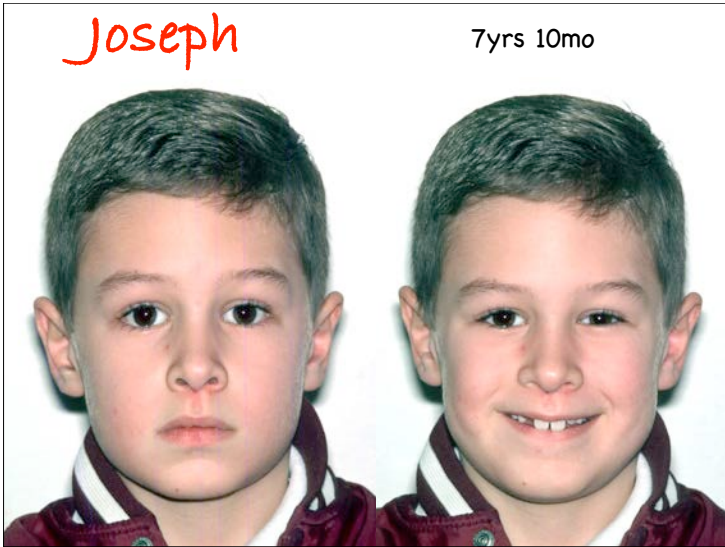
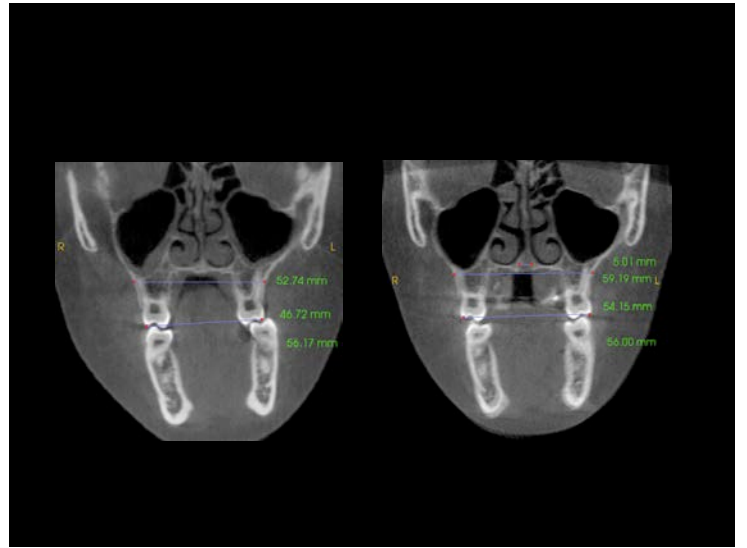
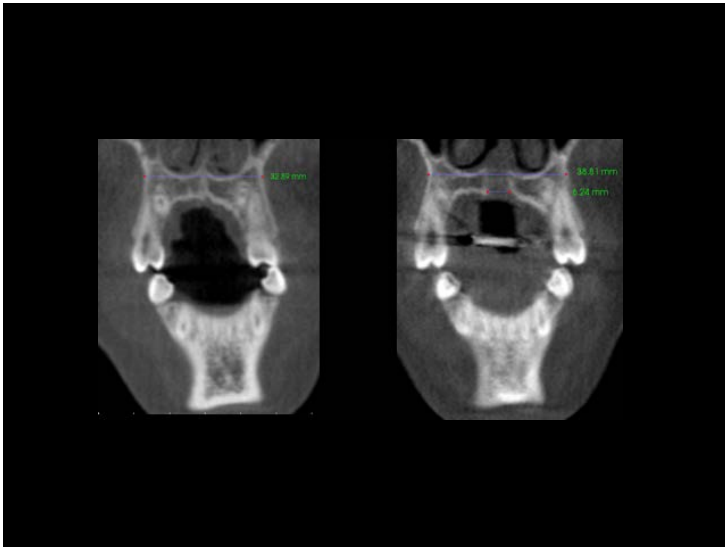


Insertion of the TAD-Supported Expander



TAD RPE in action



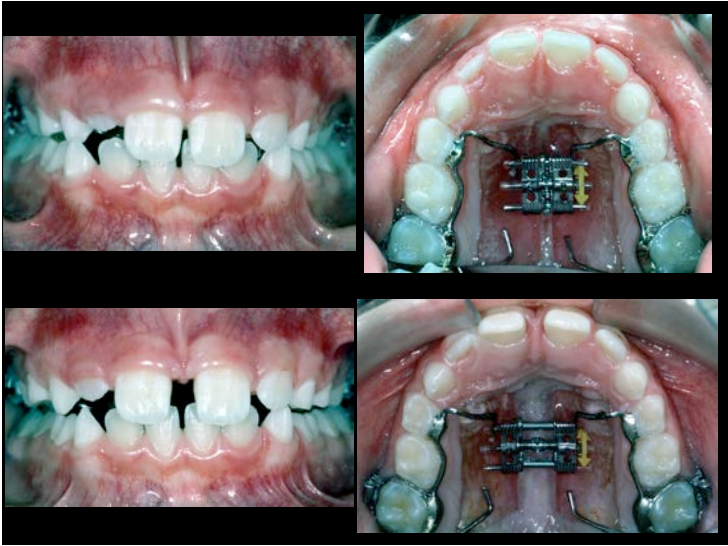


Joseph
Male
7:10 yrs

Mx-Mx: 55mm
Ag-Ag: 78mm
Dif: 23mm

Norm - Patient
-9mm

Mx-Mx: 62mm
Ag-Ag: 76mm
Dif: 14mm



Joseph
Male
7:10 yrs

Mx-Mx: 55mm
Ag-Ag: 78mm
Dif: 23mm

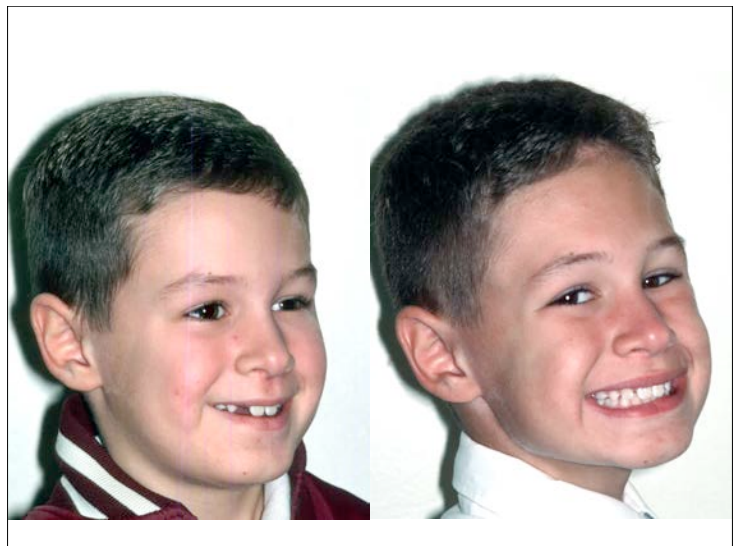
Norm - Patient
-9mm

Joseph
Male
9:1 yrs

Mx-Mx: 61mm
Ag-Ag: 79mm
Dif: 18mm

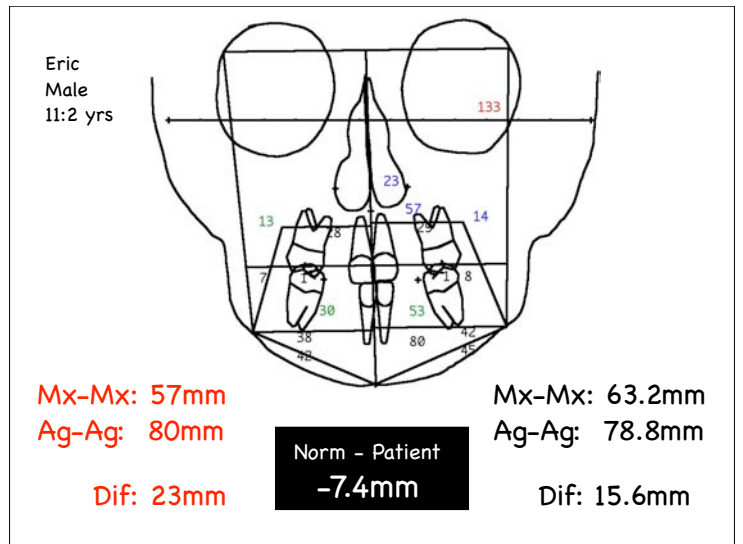
Norm - patient
-4mm

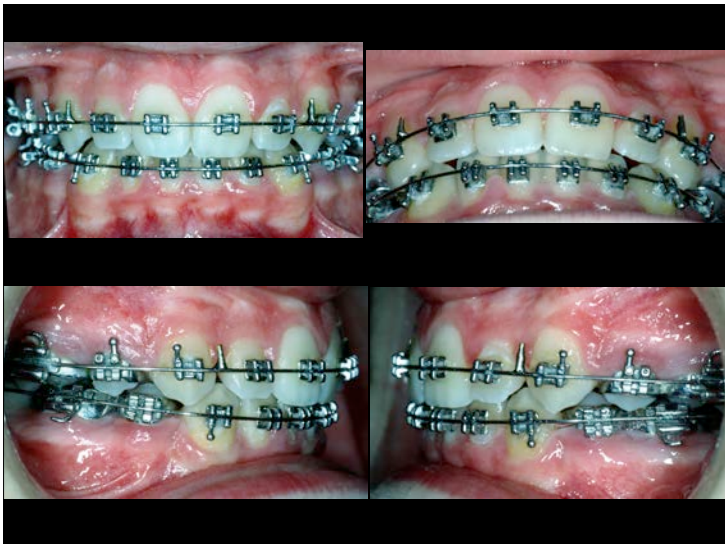
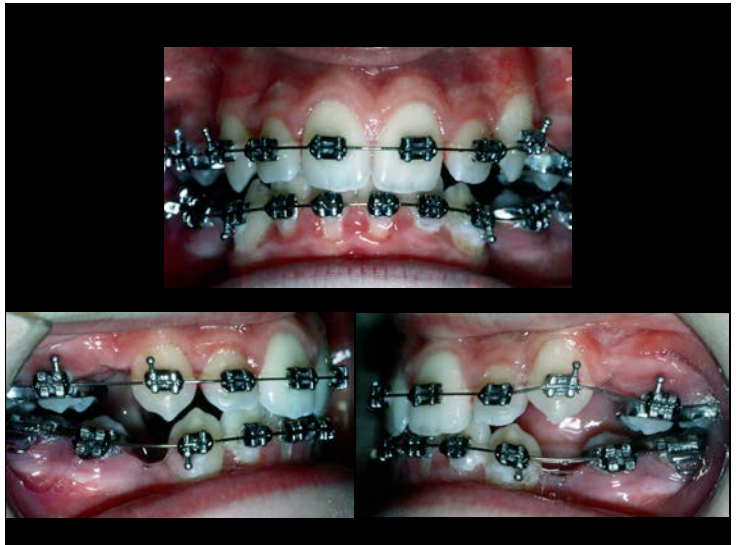
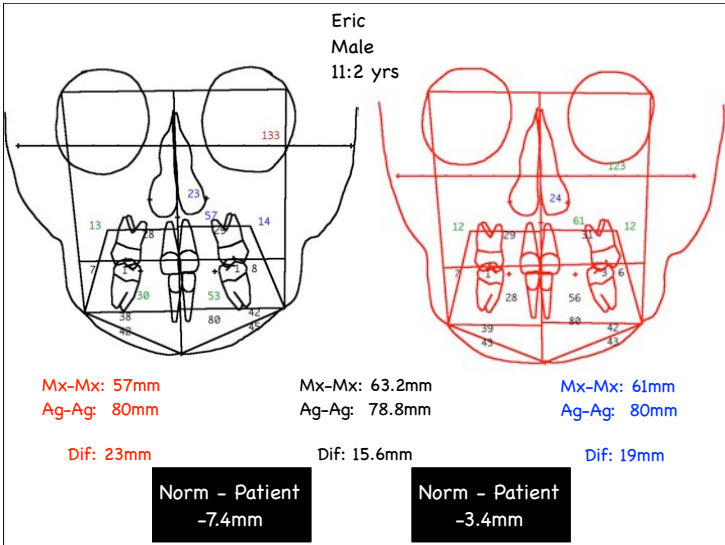
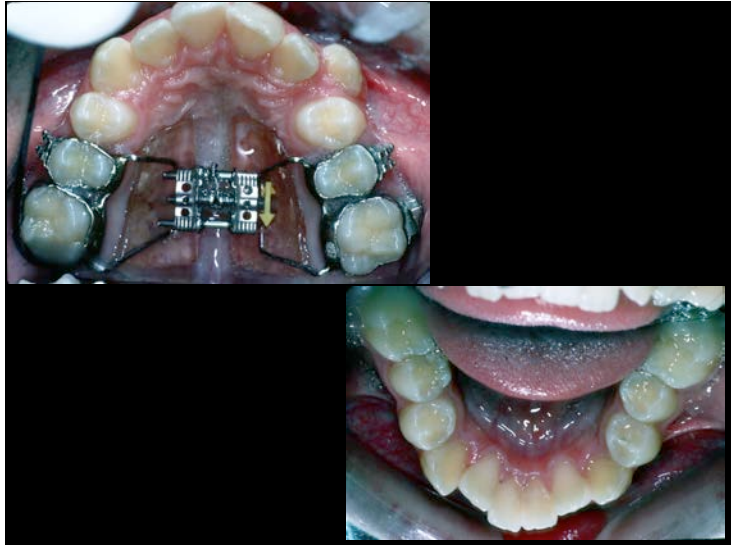
Mx-Mx: 62mm
Ag-Ag: 76mm
Dif: 14mm

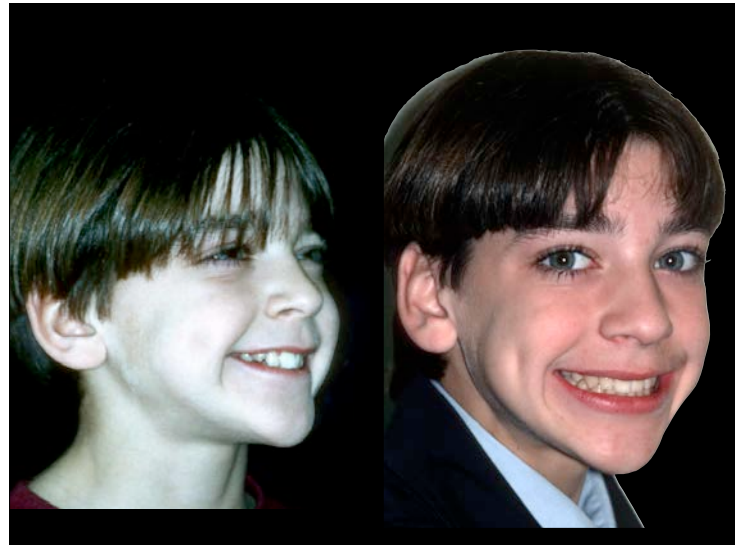


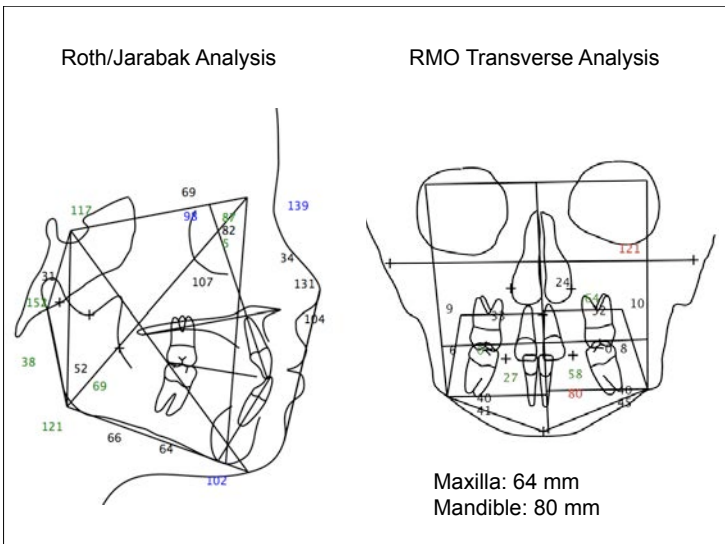
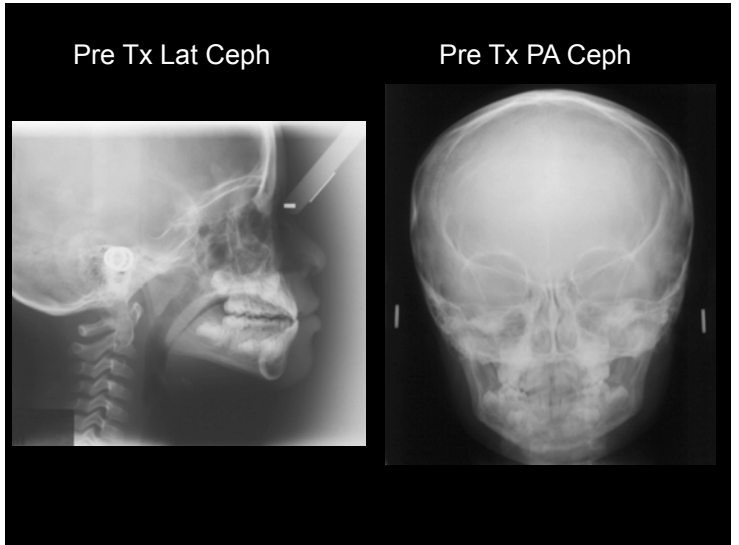
Eric

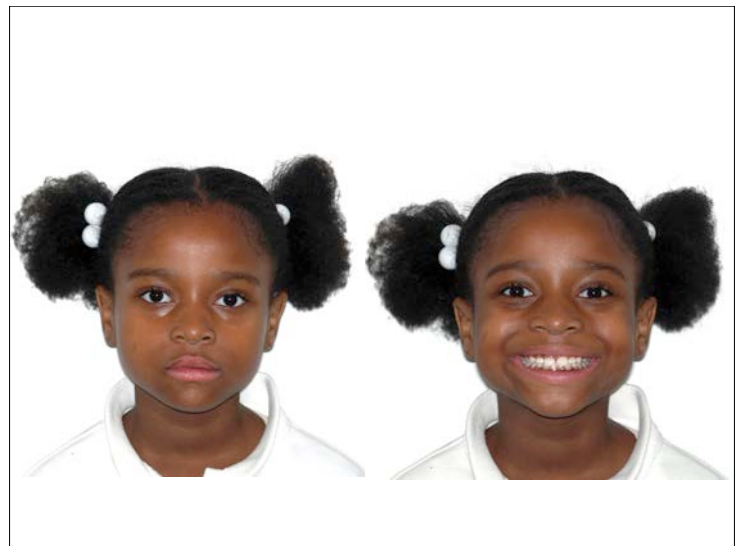
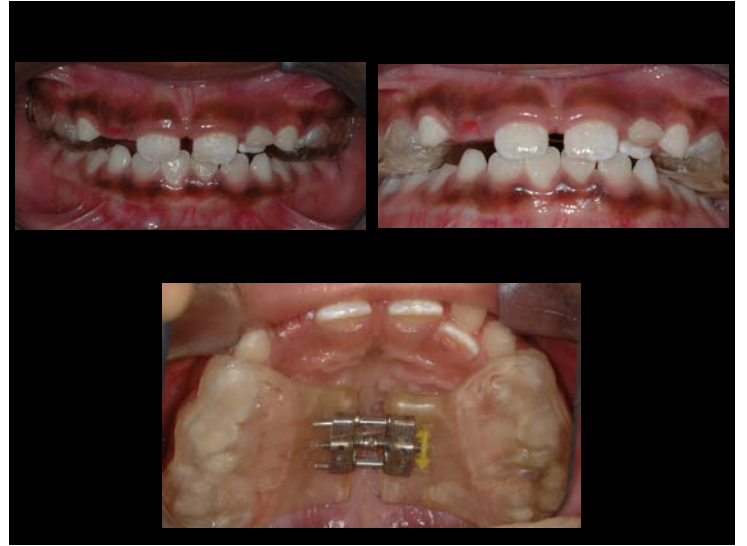
11yrs 2mo

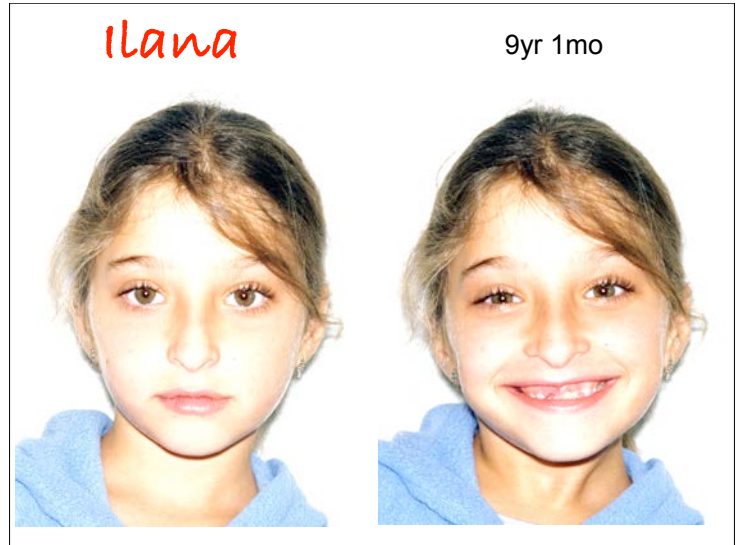
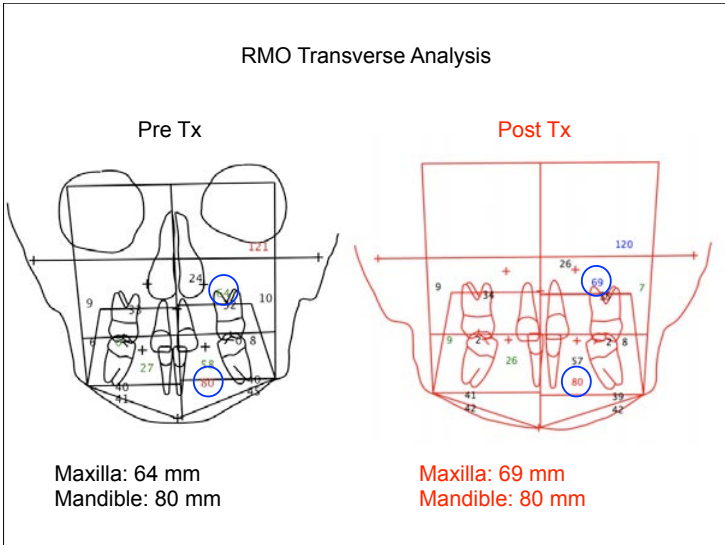
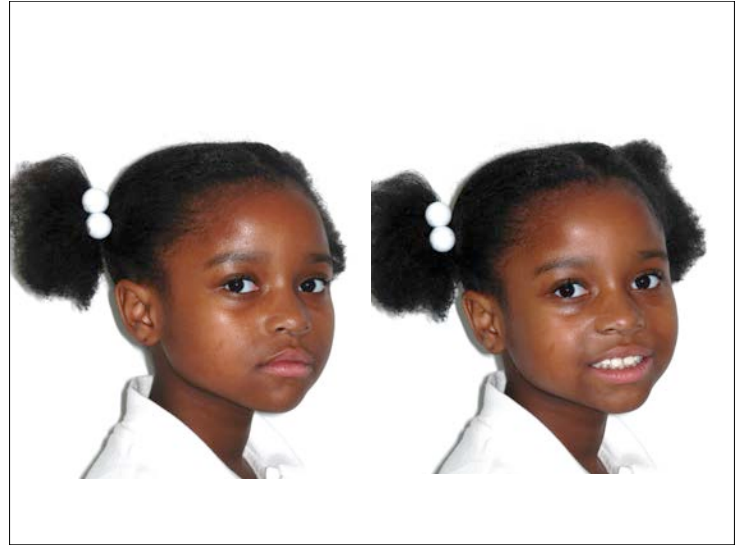
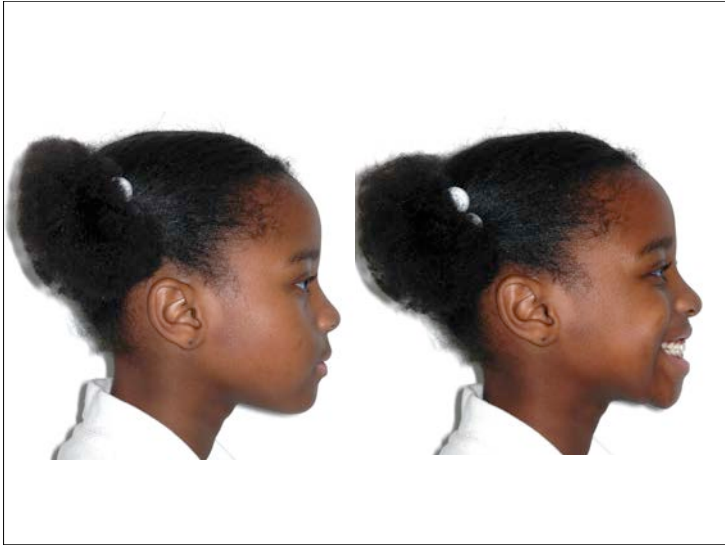


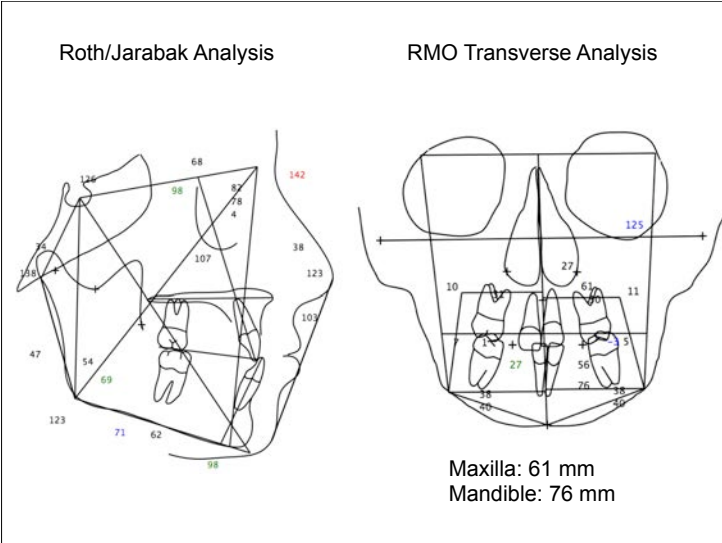
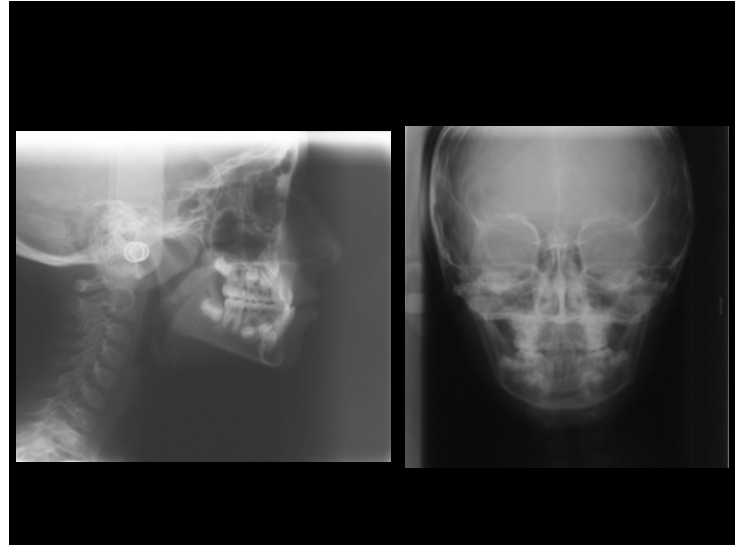


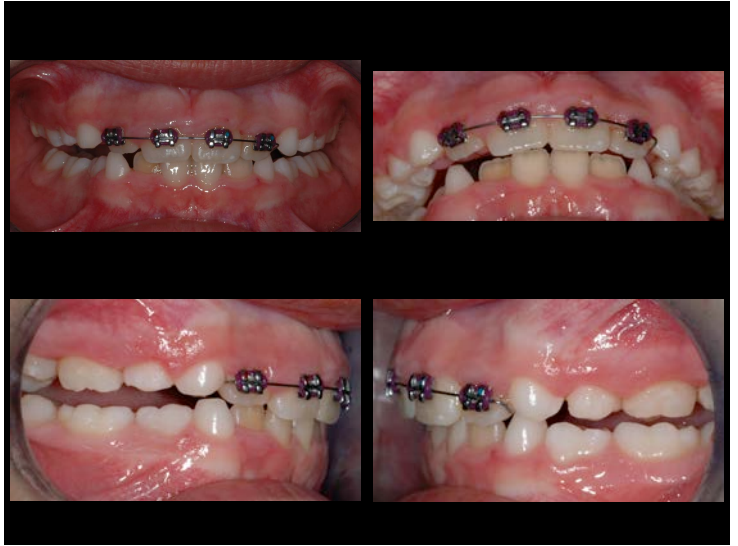
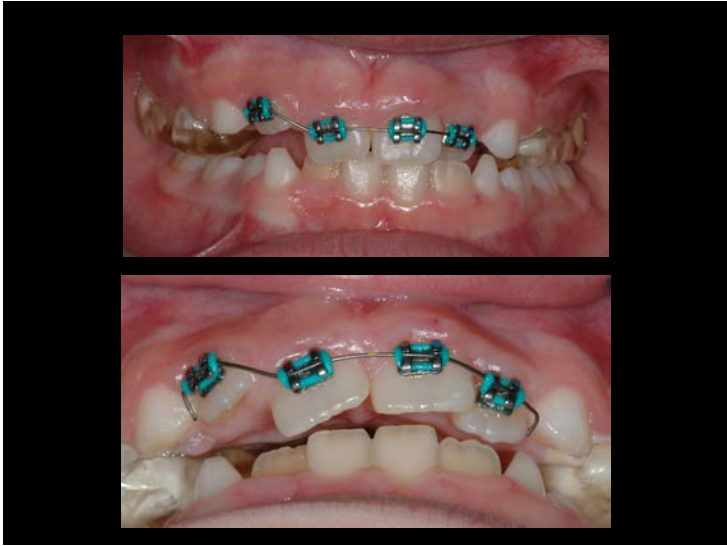




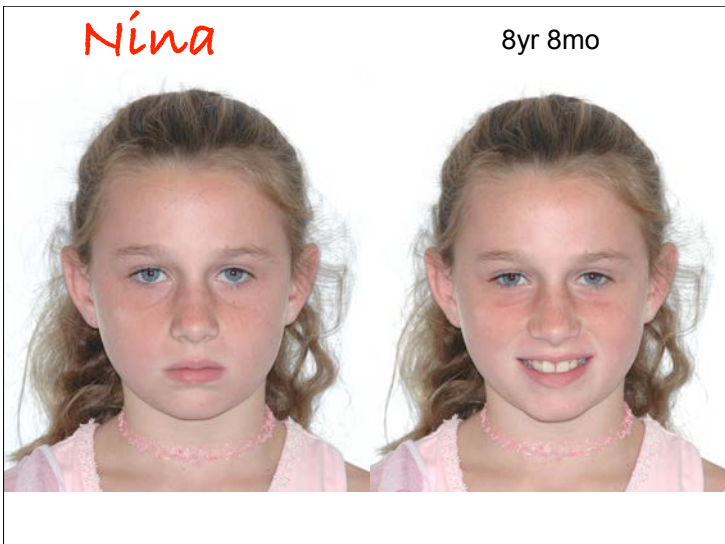
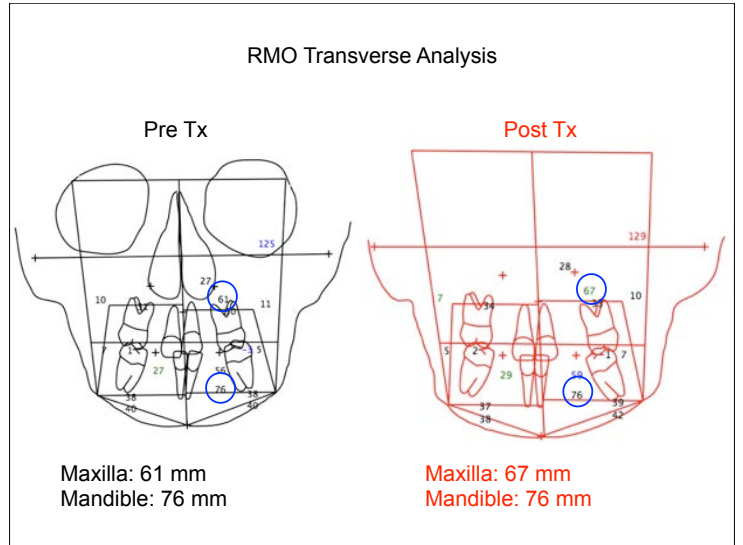


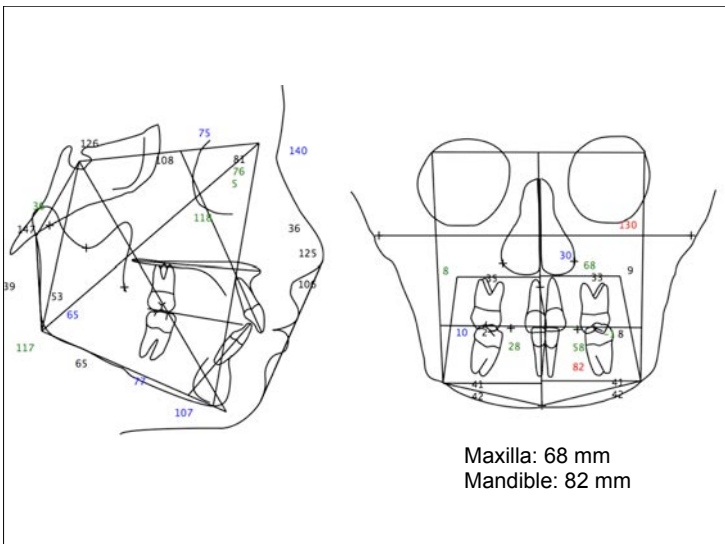




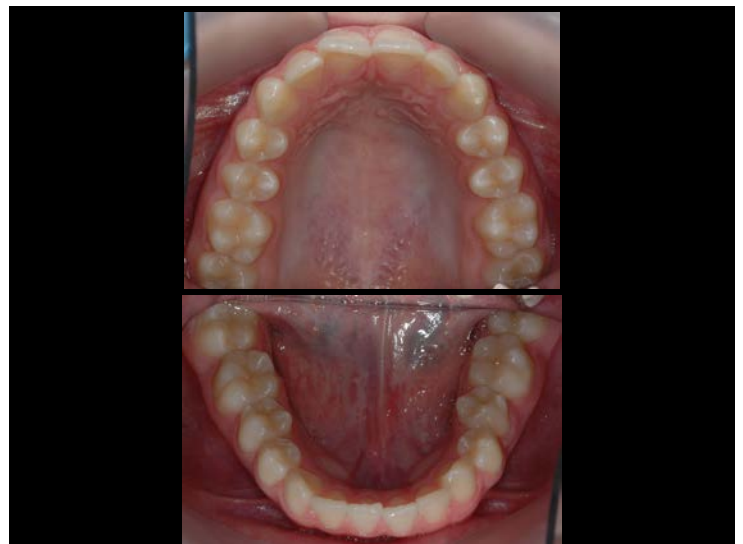
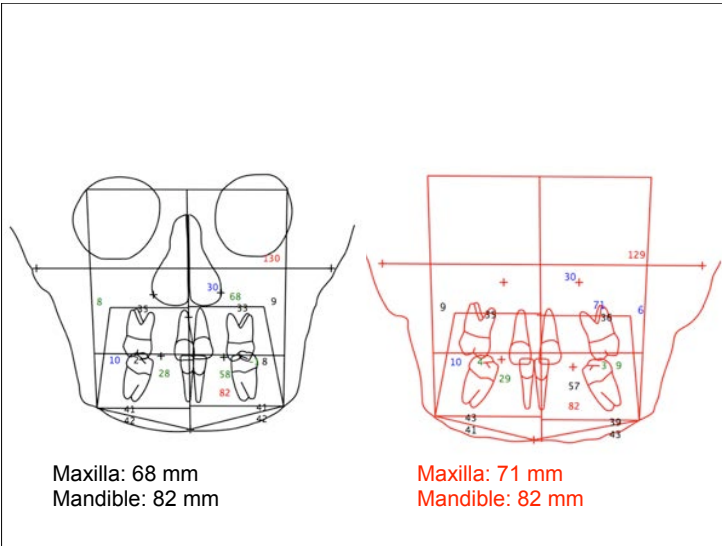


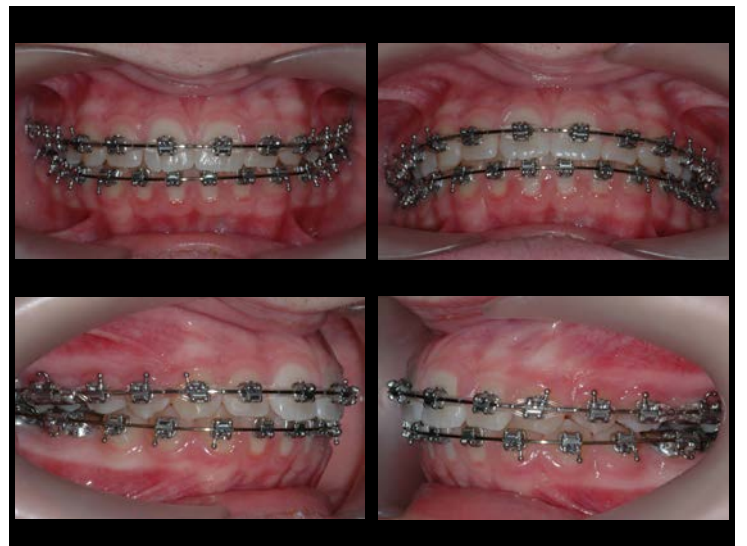


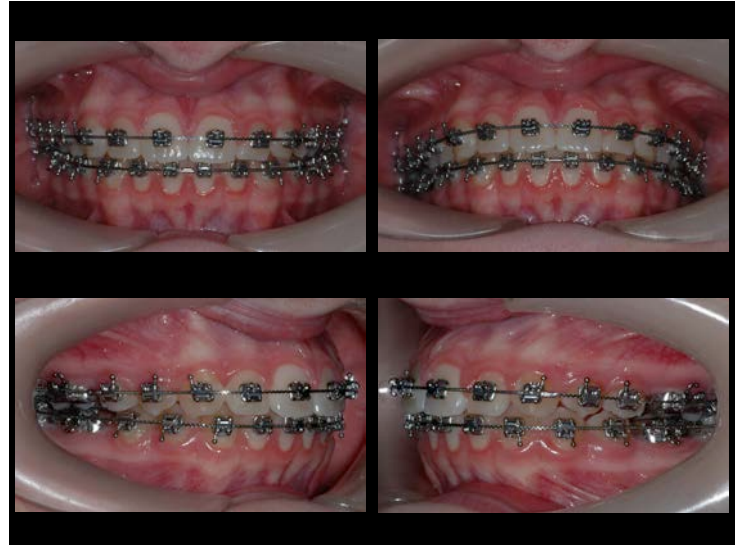
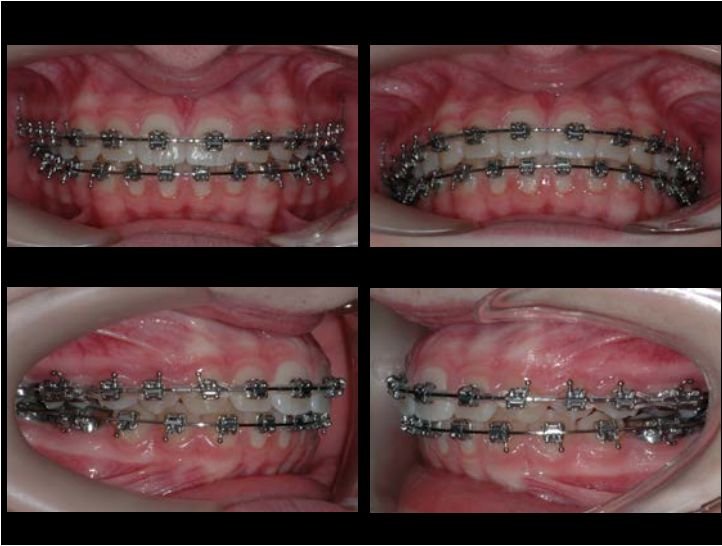




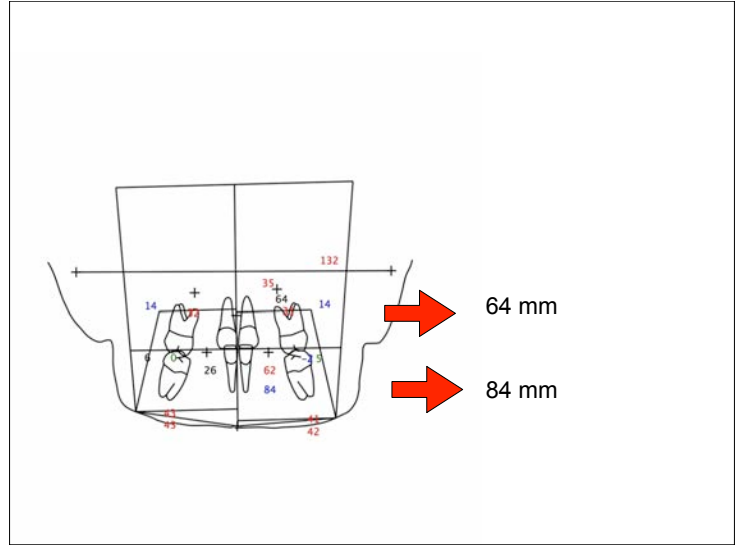


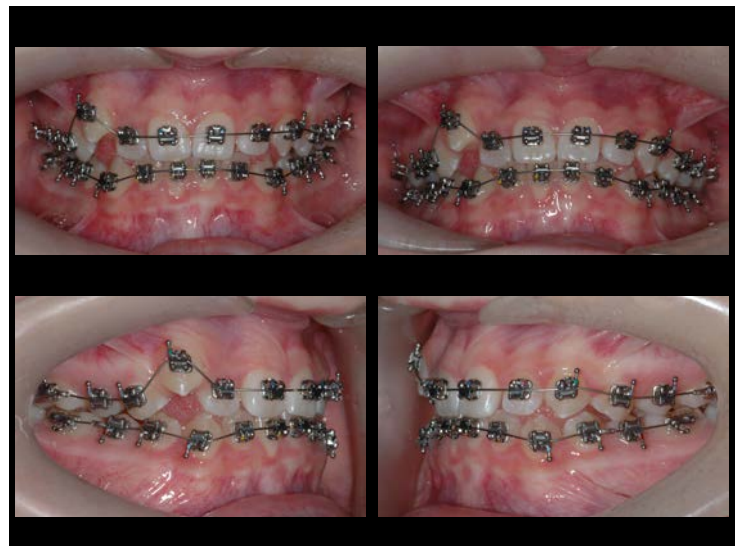
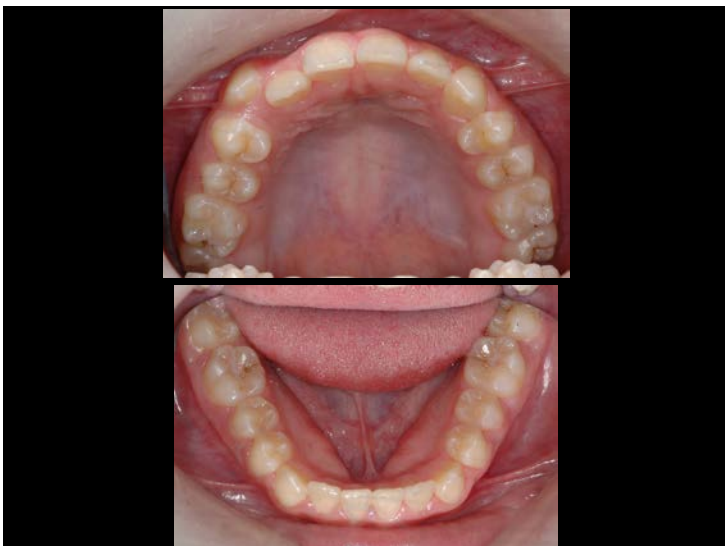


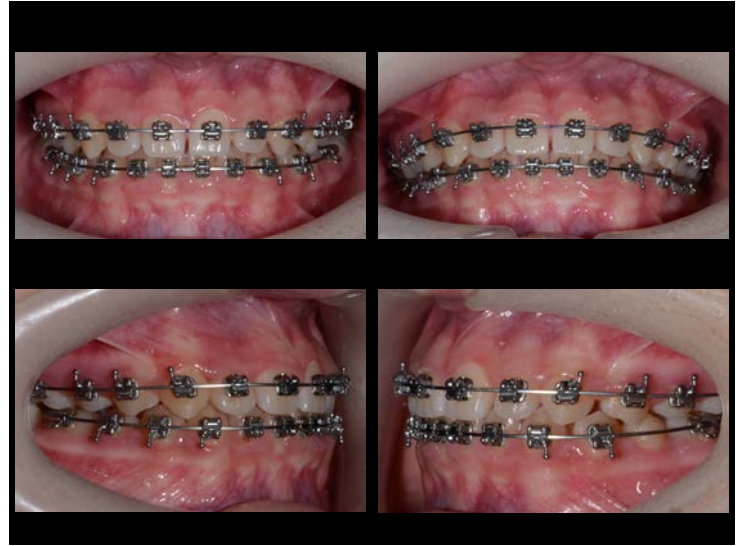
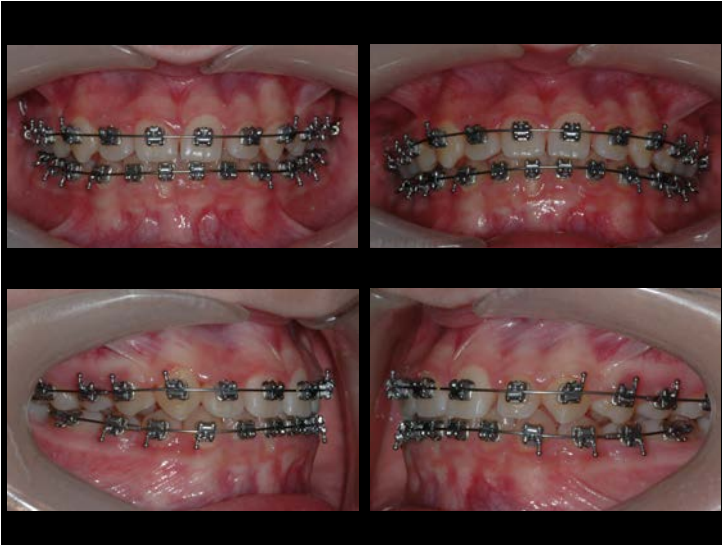






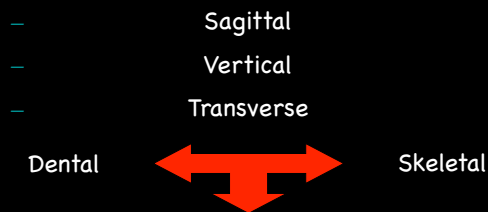






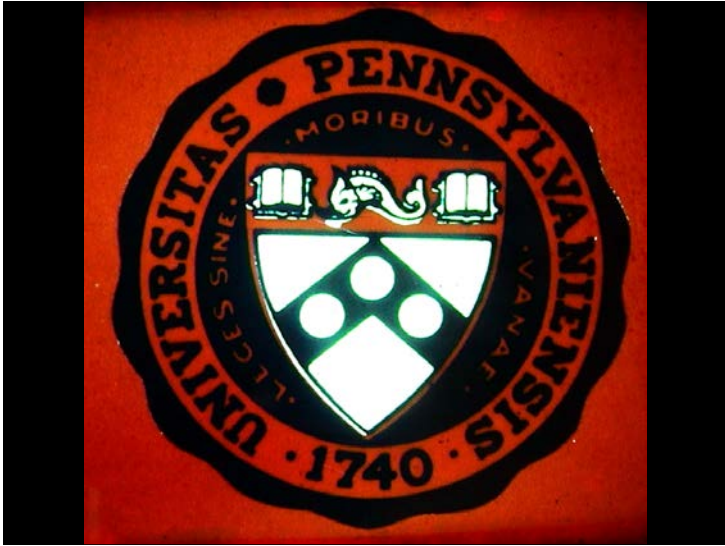
Clinical Significance **Stability**

- Basal Bone Relationships in 3 Planes



Stability

Right Diagnosis



Laurel

11yr 10mo

