Basic

Straight Wire Orthodontics

for

General & Pediatric Dentists

2022-2023

Bradford R. Williams, DDS

AOS Senior Instructor

WILLIAMS *GP* ORTHODONTIC

SEMINARS

Bradford R. Williams, DDS

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"Dr. Brad" Williams practices in Skiatook, OK where his family have been residents for over 70 years. He is married to wife, Teresa and they have five adult children and nine grandchildren. Over the years, Dr. Brad has been involved in several South American medical/dental mission trips from the Amazon rainforest villages of Guyana to the Andes mountain villages in Bolivia.

Dr. Brad is a Diplomate in the American Orthodontic Society, a member of the ADA, ODA, Tulsa County Dental Society, Academy of General Dentistry, the International Congress of Implantologists, the American College of Oral Implantology and is a gold member of the J. Dean Robertson Society of the OUCOD.

He is a 1982 Oklahoma University College of Dentistry graduate. While in school he was a contributing clinician to the Herbert T. Shillingburg, D.D.S. textbook, "Restoration of Endodontically Treated Teeth." He has practiced general dentistry for 40 years and has been practicing GP orthodontics for 39 years. He first joined the AOS in 1983 and studied the Begg technique with Dr. Charlie Yates. After 10 years he switched to Tip Edge orthodontics with the Kesling Rocke group under the instruction of Peter Kesling.

Around 1999, he changed techniques again and began straight wire orthodontic training with Dr. Bob Gerety and Dr. David Jackson and has been doing straight wire orthodontics in his practice ever since.

Dr. Williams has been placing implants since 1993 and has been implementing orthodontic mini screws since 2005. He has collaborated with Dr. Juan Echeverri and Dr. Randy Newby in a TAD overview course and presents material on TADs in the AOS intermediate course every year.

He was awarded AOS Fellowship in 2009 and diplomat in the AOS in 2010. He is a senior instructor for the AOS and teaches the Basic and Intermediate Straightwire Orthodontic courses. He has served on the AOS board of directors, has written and collaborated on articles for the AOS journal and is very active in our society. Dr. Brad's sons, Dr. Brad II and Dr. Alex Williams are AOS members as well.

Dr. Brad's hobbies include drawing and painting, target shooting with handguns and shotguns and the last several years he has spent hours tweaking his power point lectures but most of all, he loves to spend as much of his spare time as possible with the kids and grandkids.

Dr. Brad brings a level general practice clinical experience to the classroom that translates very well into a teaching style that every practicing general and pediatric dentist can truly relate.

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WILLIAMS GP ORTHODONTIC SEMINARS

Bradford R. Williams, DDS

Dear Colleagues,

Welcome to the Basic Straight Wire Orthodontics course. This notebook is certainly not the course in total but rather, a very detailed syllabus. If a dentist could learn orthodontics from a book, none of us would be in this class and all general dentists would be doing orthodontics.

To learn the basics of orthodontics and incorporate it into practice, a dentist needs a good instructor and course, classmates who can become lifelong friends who share one another's experiences and challenges and an organization that provides support, advocacy, continuing education and a membership of professionals who practice ortho and are willing to share and assist each other when needed. This course is just such a class, you can be just such a classmate, I strive to be that instructor and the AOS is absolutely that organization. I hope that all of you make ortho a part of your careers and that all of you remain members of the AOS all your lives. Use it to continue your orthodontic education, peer advancement and credentialing. Becoming a Diplomate in the AOS should be a goal for all of you who want to add ortho to your practices.

The goal of this course is to prepare the student to successfully diagnose and treatment plan Class I and Class II malocclusions in patients and acquire competence in treating them. At the end of this course, the student should be proficient in basic orthodontics.

This Basic course is by no means a complete education in orthodontics. This is only the beginning. It is my hope that each student realizes that orthodontics is an ongoing learning process. Wisdom is knowing which cases to treat and which cases to refer. This is the most important skill I hope to teach you in this first course. Friday and Saturday sessions will consist entirely of didactics, cephalometrics, diagnosis, treatment planning, and hands-on exercises. Sunday mornings will be entirely devoted to your cases as we review each of them as a class. I highly recommend for you to bring at least one case to each session to review with the class.

My aspiration for you is that you find the same excitement and satisfaction in adding orthodontics to your practice that I have. I am honored you have chosen me to lead you in this basic ortho course. Know that I will work my very hardest to deserve the trust you have placed in me. Again, thank you and welcome!

Sincerely,

Bradford R. Williams, DDS
AOS Senior Instructor
AOS Diplomate

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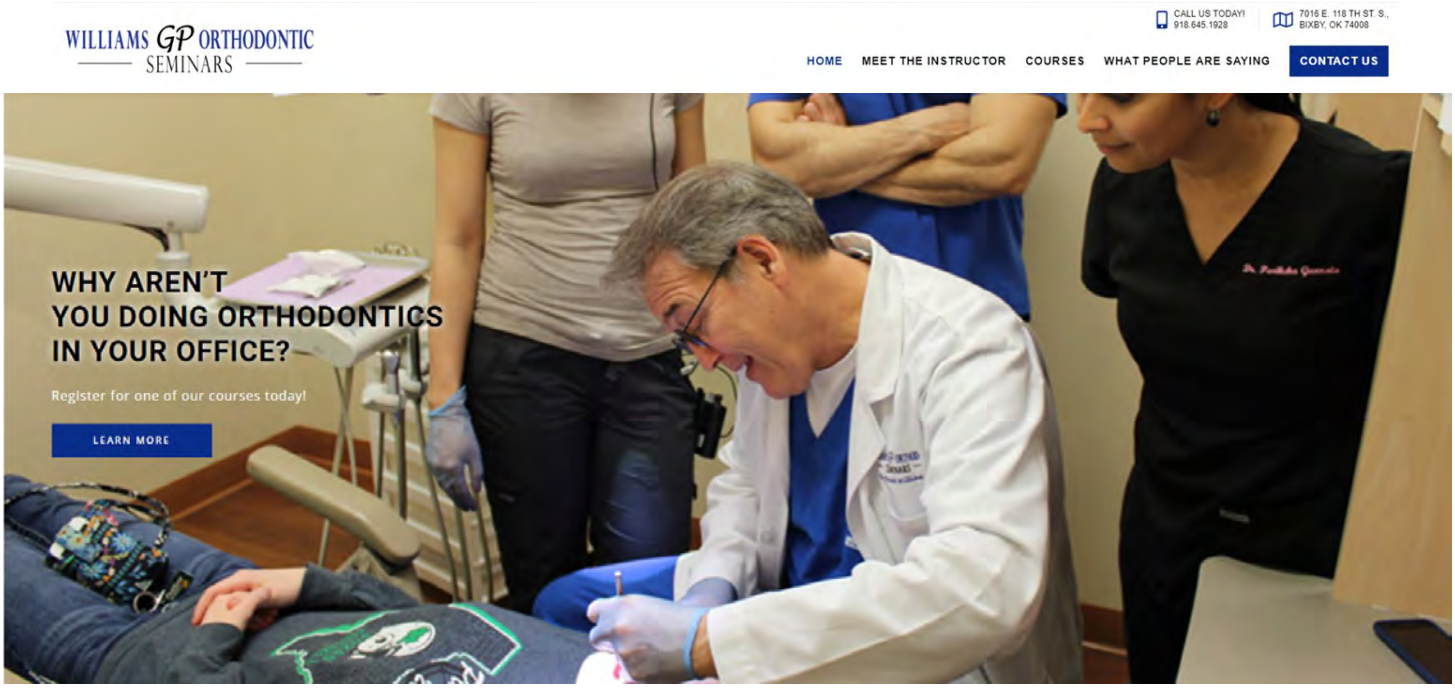
My website is a great place to find information about courses and support to successfully add orthodontics to your GP or Pediatric practice.



www.williamsGPorthodontics.com

Check out our Facebook Secret Group

Send a friend request to Teresa Berry Williams for an invitation into the Secret Group.

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Order of Contents

Basic Course

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Course Guidelines

Overview & Mission Statement

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Course Guidelines

My Basic Premise

You truly want to make orthodontics an integral and profitable part of your practice.

My Mission to You

- Teach you basic/intermediate concepts in straightwire orthodontics
- Teach you a predictable method of diagnosis and orthodontic treatment for your patients.
- Teach you how to treat 70-80% of the patients in your practice who need orthodontics.
- Provide support to you long after this course is over.

Overview of this Course

- Understanding the necessary diagnostic records required for diagnosis (the patient data base).
- Understanding cephalometrics
- Understanding diagnosis
- Understanding treatment planning and treatment goals (the orthodontic standard of care).
- Knowing when to treat and when to refer
- Gaining basic/intermediate knowledge in orthodontic movements through a series of exercises on an orthodontic typodont.
- Reviewing your cases as a group and supporting you as you begin to treat and complete orthodontic cases.

Course Format

- FRIDAY & SATURDAY will be dedicated to lecture, questions/answers time, cephalometrics, diagnosis, treatment planning, and performing basic orthodontic movements on a typodont.
- SUNDAY AM will consist of you presenting cases you are considering treating, you performing the diagnosis and treatment planning, presenting your case to the class and discussion from your fellow classmates.

Non-Disclosure Agreement

- Please sign and return the form today.
- Understand that I and my team have worked for the last 5 years to revise this course and exercises.
- You have paid to own what I hope will be a manual you will refer back to for years to come.
- Please don't share these materials without my expressed written permission. This includes associates and assistants, corporate doctors sharing within their respective corporations, etc.

Ground Rule for Sundays, Lunchtime and Breaks

- The Sunday session is set aside specifically to look at your cases. It is your time. It is a critical part of your course experience. Sundays will help you launch ortho in your office. Please make every effort to attend!
- The breaks during Fridays and Saturdays are for you to stretch, get food or drink, go to the restroom, take care of personal or office matters by phone and speak with the vendors as your needs direct.
- These breaks are for the instructor too.
- Please refrain from using break & lunchtime to engage the instructor about your cases or office issues. This is business for Sundays.
- If you are unable to attend Sunday morning and have questions for the instructor, please contact by email outside of course weekend time.
- Respect the instructor and other classroom participants; be sensitive to their experience.

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Your Course Responsibilities

- Please silence your cell phones and take conversations with your neighbors outside the classroom
- Have all the tools & supplies recommended for each session with you for class every session. If unsure about anything on the list or the schedule, ask me, Susan, Barb or Kristi.
- Do the exercises even if they seem repetitious and simple. Until you start cases in your office, these exercises are the only practice at cutting, bending, inserting and ligating that you will get.
- As an **active** AOS member, you may attend all FIVE sessions again in the **immediate** following year as a monitor, free of charge.
- You will receive the same hours of C.E. credit for monitoring the course the following year as you earned in your first year.
- You are encouraged to enroll staff in the ortho assistant/hygienist training course.
- I also offer an ortho management course for your front office staff.

My Philosophy as a Teacher:

- There are no stupid questions.
- I encourage class discussion and interaction.
- I am teaching a predictable system of orthodontic diagnosis and treatment which I have developed over the last thirty-five years.
- If you are experienced in orthodontics and use a different system, please limit your comments about your system to me after hours and by email. There are many ways to treat but I am teaching this one and I wish to avoid confusion.

DO NOT record or take photographs of any lecture, PowerPoints or videos shown during this course. All material is copyrighted.

Videos

The material and videos that are presented in class are documented in a step-by-step manner in your course notebook.

In Conclusion:

My commitment to you as well as the commitment of the American Orthodontic Society is to support and prepare you to add orthodontic services to your daily office routine and to make orthodontics a profitable portion of your practice. As an AOS Senior Instructor, Chief Clinician in this course and as a Diplomate in the AOS,
I am committed to teach you basic/intermediate concepts in orthodontics and the predictable system of treatment that is currently serving me very well in my busy general practice.

Williams GP Orthodontic Seminars also offers training for your entire staff to assist you in successfully incorporating orthodontics into your practice.

If you have questions, concerns or need my help, you may reach me at:

bwilliamsortho@gmail.com
Cell- 918.645.1928
Office– 918.396.3711
www.williams*GP*orthodontics.com

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INCORPORATING ORTHODONTICS

Into the General & Pediatric Practice

Basic Course

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Why Are You Here?

IS THIS YOU?

NO ORTHODONTICS TAUGHT IN DENTAL SCHOOL

YOU WANT A BETTER UNDERSTANDING OF ORTHODONTIC PROBLEMS YOU ENCOUNTER IN PRACTICE AND WITH RO'S

USING ALIGNERS BUT GETTING UNSATISFACTORY RESULTS OR HAVING PROBLEMS ALIGNERS JUST CAN'T FIX

USING FAST BRACES/SIX MONTHS SMILES BUT GETTING UNSATISFACTORY RESULTS OR PROBLEMS YOU JUST CAN'T FIX OR UNDERSTAND

NEED CE, WANTED SOMETHING DIFFERENT

NOT SURE ORTHO IS FOR ME, BUT CURIOUS

Everyone who walks in your door would like to have a beautiful smile!

So, if you are not here to start delivering ortho in your office…..why not?

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So, what is stopping you?

Are your ideas fixed by the training and programming you received as a student dentist?

THERE WERE NO REQUIREMENTS IN ORTHODONTICS AT YOUR DENTAL SCHOOL

YOU WERE DISCOURAGED TO LEARN ORTHODONTICS IN SCHOOL

PRACTICAL REALITY OF MAKING ORTHO A REQUIREMENT IN SCHOOL TOO OVERWHELMING FOR A GP PROGRAM.

YOU WERE ENCOURAGED TO ALWAYS REFER ORTHODONTICS TO THE SPECIALIST.

ONLY FOR THE ELITE. A COMPLETELY ESOTERIC DISCIPLINE. WE WERE MADE TO VIEW IT AS A "CLOSED DOOR" SOCIETY OF CLINICIANS

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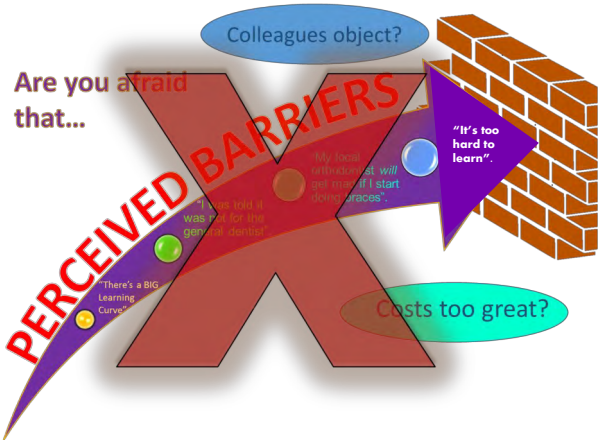

Incorporating orthodontics into your general practice increases your referral base.

Your patients trust you. They have the relationship with you.

Reality

They want you to do their braces. They do not want to go somewhere else.

If you say you can treat them orthodontically, they believe you.

ABSOLUTELY!!

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FACTS

70+ % of all malocclusions are Class I and simple Class II

That three to five orthodontic case starts per month would increase your bottom line in your practice by $180,000 to $300,000 per year

The average fee for a Class I or Class II orthodontic case is $5,000

Don't forget the other benefits:

BENEFITS

- Referral bases produce referral dollar income streams.
- Orthodontics is a hygiene filler (patients with braces need their teeth cleaned every three months!)
- Patients with braces need to be on fluoride, rinses, Sonicares, etc.
- Patients with braces need restorative, periodontics, pedodontics, oral surgery, and other dental procedures.

Lots of other benefits:

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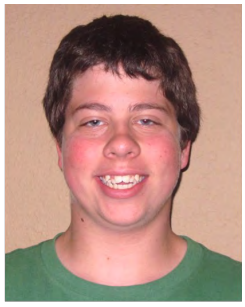
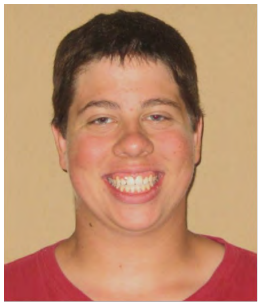
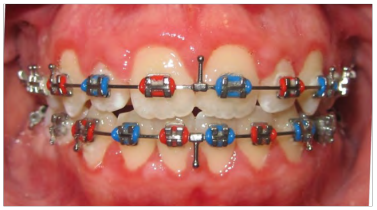
At least in my world, marketing internally has been huge, once you begin on a patient like this, she has a brother, a mother and father, cousins, aunts, uncles, friends, etc.

And...So do their mothers, fathers, brothers, sisters, cousins, friends, and everyone else they know!!



Nothing can make such dramatic changes in your patient's smiles… and lives!





Orthodontics is LIFE CHANGING

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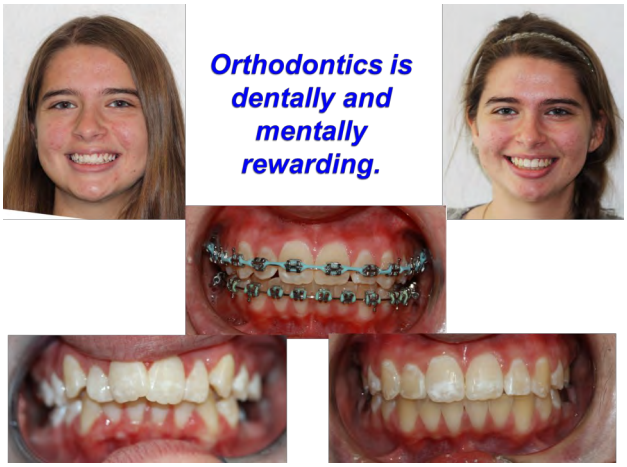
And I am telling you, it isn't beyond your capabilities or your technical skills…

If you can do Molar Endodontics.... = You can learn to straighten teeth.

Orthodontics is career changing



Orthodontics is dentally and mentally rewarding.

If you can place implants or take out wisdom teeth.... = You can learn to straighten teeth.

So simple, yet so transforming

If you can restore a mouth with crowns and bridges..... = You can learn to straighten teeth.

Why not learn some basic orthodontics?

If you can place composite restorations.... = You can straighten teeth.

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The Bottom Line…

If there is defect in the soul, it can't be corrected on the face, but if there is defect on the face…and one corrects it, it can correct a soul. ***-Jean Cocteau***

On so many different levels, nothing is more important than a smile….nothing! Why would you ever pass up the chance to change smiles and change lives providing this wonderful service!

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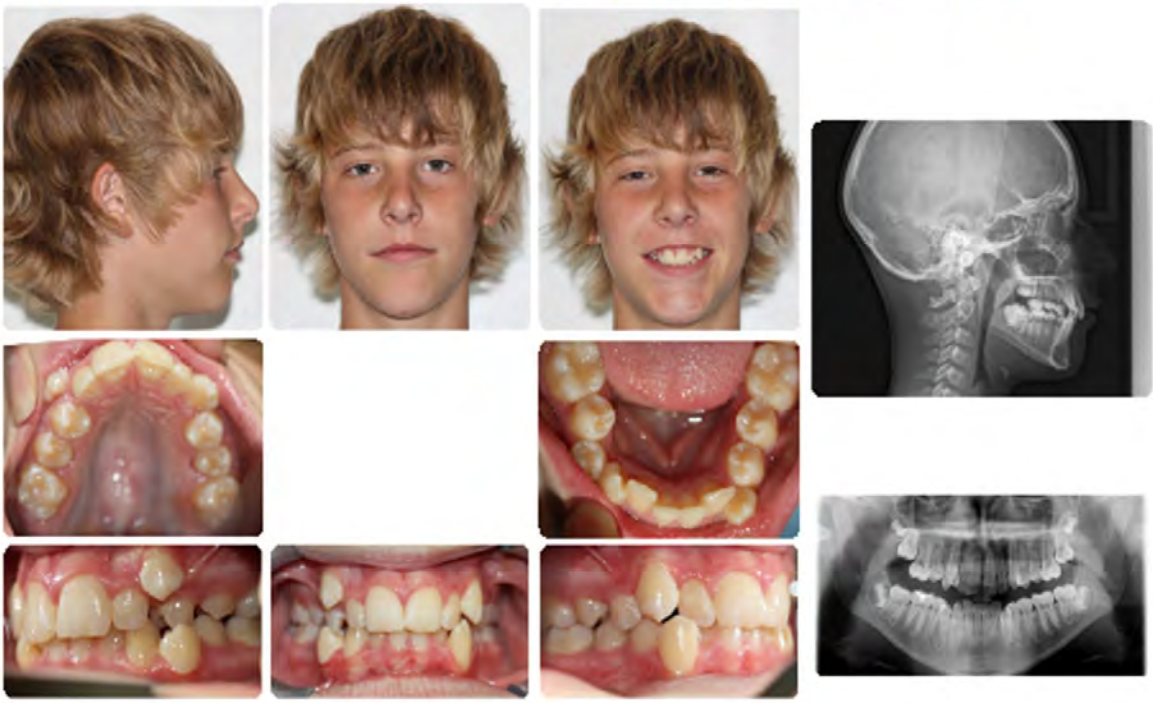
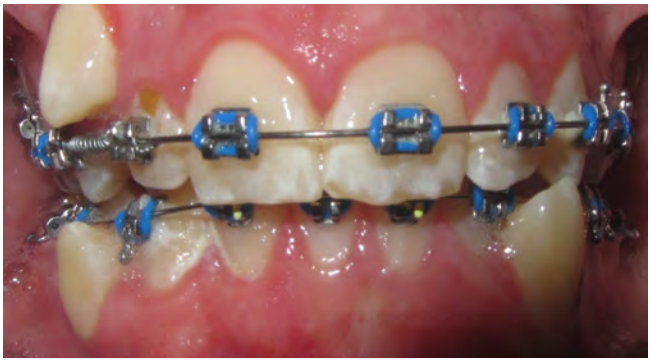
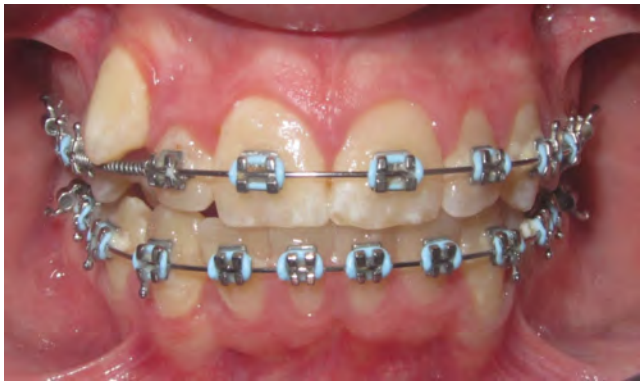
Just look at this case. You can do this. I will show you how!







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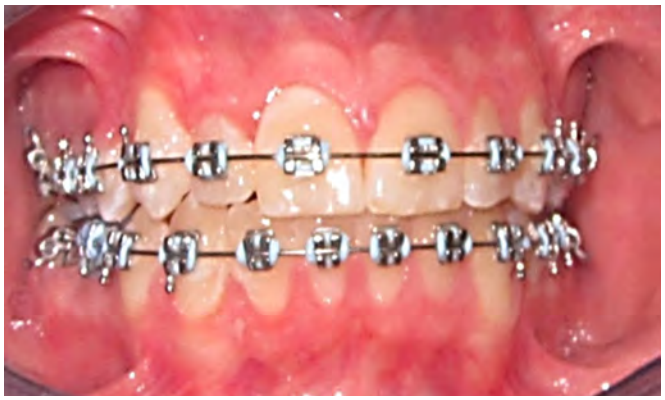

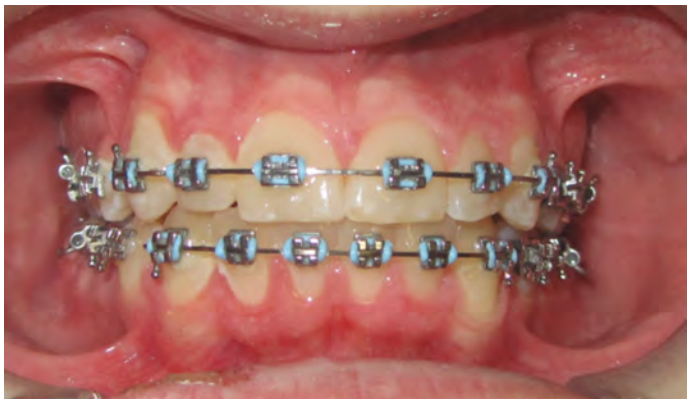

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BEFORE **AFTER** **POST TREATMENT**

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Think About It...

- So why is it that so many GPs and Pedodontists attend orthodontic courses with so much trepidation, fear and maybe even a little guilt and shame.
- Do you know what I mean?
- It seems to be only an orthodontic issue. No other dental discipline makes us feel that way!
- Let's take a look at the evolution of the orthodontic discipline. This will help us understand how the notion developed.
- The history of orthodontics created the belief that only a select and devoted few should attempt to practice.
- Let's just take a look…

Orthodontic History

- Crowded, irregular, and protruding teeth have been a problem since antiquity, and attempts to correct this disorder go back to at least to 1000 B.C.
- There is an incredibly rich and interesting historic evolution of orthodontics that covers centuries. But we will pick up with modern history.
- Dr. Edward Angle is known as the "father of modern orthodontics" and in 1890 he established the specialty of orthodontics. Angle established the first orthodontic school in 1905 in St. Louis, Missouri.

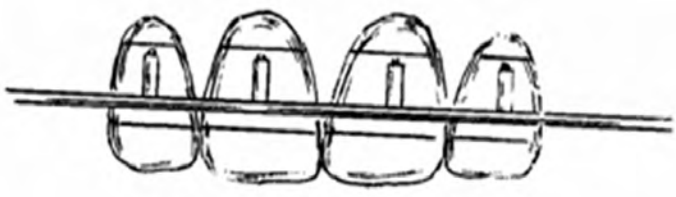
EDWARD HARTLEY ANGLE

- For the first third of this past century, orthodontics found itself dominated by this one man, Edward H. Angle. The father of modern orthodontics.

Meeting of the Angle Society of Orthodontists on May 3, 1925, where the Edgewise mechanism was taught for the first time. Dr. Angle is seated at left, Dr. Begg in center behind empty chair.

- In the 20th century ,Edward Angle devised the first simple classification system for malocclusions, and he introduced Edgewise appliance.
- In 1910 angle developed the pin and tube appliance, it had gold and platinum bands and attachments for most teeth.

Angle's Classification of Malocclusion: Angle Class I, Class II div. 1 & 2, Class III



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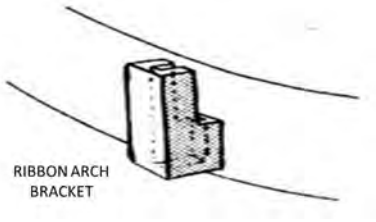
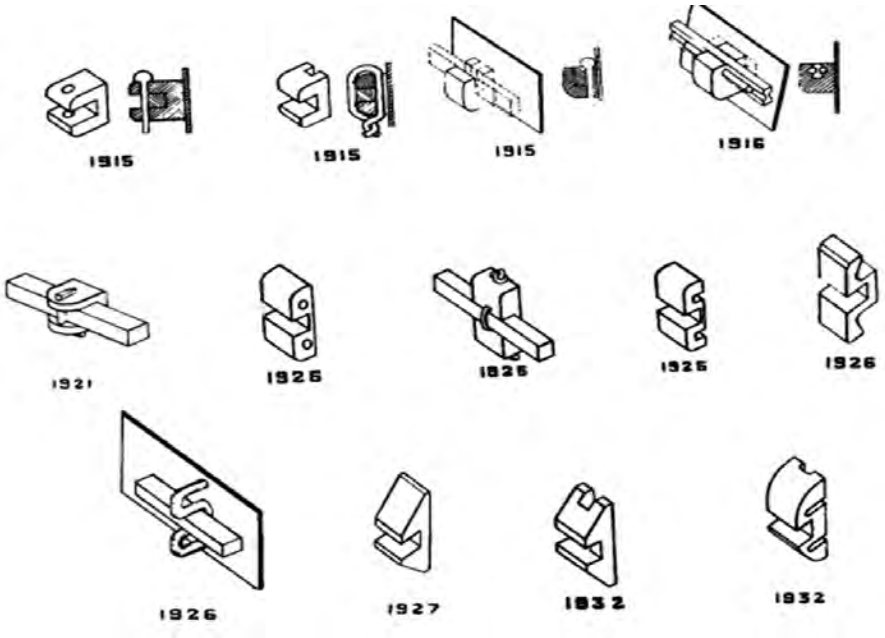
- Angle stated that the ideal appliance would be the one that could provide light and continuous forces in the desired directions and according to that he then developed the ribbon appliance …which included a delicate metal device welded to the bands. This device was called a “bracket” by Angle.



- Therefore, the edgewise bracket did not suddenly spring full-grown from Angle's fertile mind, but slowly evolved with several iterations
- Angle's many iterations of the edgewise bracket:



- The Edgewise Appliance, on which modern orthodontics appliances are based, has identical brackets for all teeth, and tooth movement was accomplished by adding bends to rectangular arch wires , which were held in the bracket slot using metal ligatures.
- The first brackets were made of gold, because of the softness of the gold they tended to lose their shape easily due to the forces generated by the occlusion and the ligature.

- Edgewise appliance allowed movement of teeth in all directions…however rotation was still difficult to accomplish.
- Note: The Edgewise appliance was developed for treatment without extractions. This appliance supplied the needs of that time.
- Edward Angle died on August 11, 1930 ….”I finished my work as perfect as it was possible to do it.”

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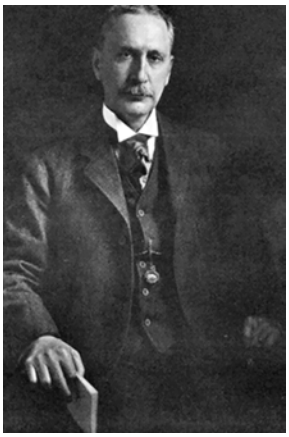
Dr. Angle's Indications for Orthodontic Treatment

Dr. Edward Angle
Father of Orthodontics



Protruding, irregular, or maloccluded teeth can cause 3 types of problems for the patient:

- (**1**) psychological , (*self esteem, depression, etc.)*
- (**2**) problems with oral function, including difficulties in jaw movement, TMJ disorders, and problems with chewing, swallowing, or speech
- (**3**) problems of accentuated periodontal disease or tooth decay.

1 psychological

2 functional

3 dental disease

Standard Edgewise Appliance

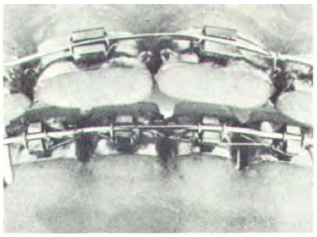


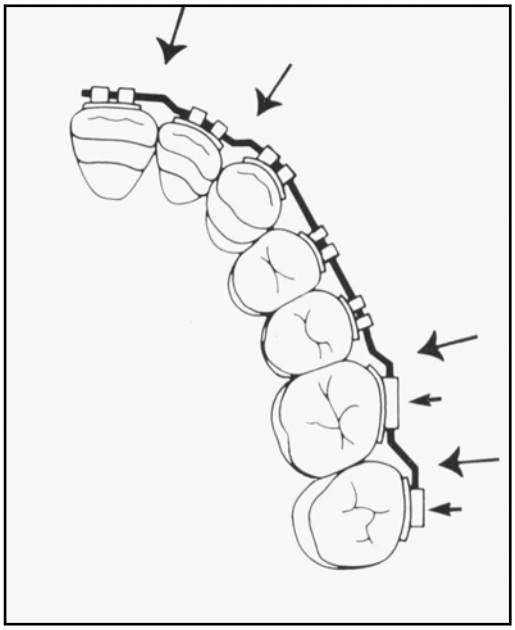
Fig. 10-38 ■ Angle's edgewise appliance received its name because the archwire was inserted at a 90 degree angle to the plane of insertion of the ribbon arch. With the rectangular wire in a rectangular slot, excellent control of root position was possible.

Standard Edgewise (Non-Programmed)

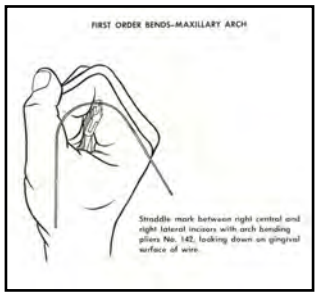
- Rectangular "edgewise" archwire slot
- "Zero-Zero" meaning no in/out, tip, torque built into appliance
- Two tie-wing design (twin) or one tie-wing design (tweed)
- All first, second, and third order bends per tooth (28 teeth) must be put in by doctor

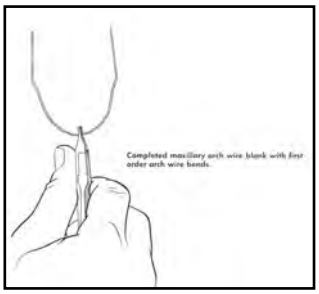
The 3 Major Archwire Bends

- In/Out (First Order Bends)
- Tip (Second Order Bends)
- Torque (Third Order Bends)



1st Order Wire Bends In/Out





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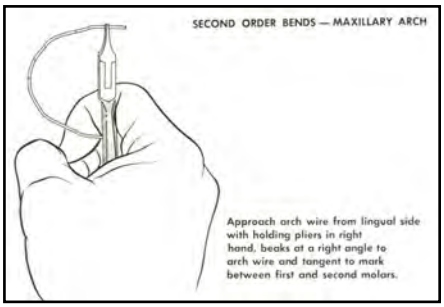
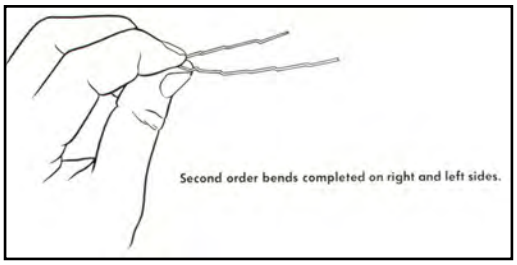
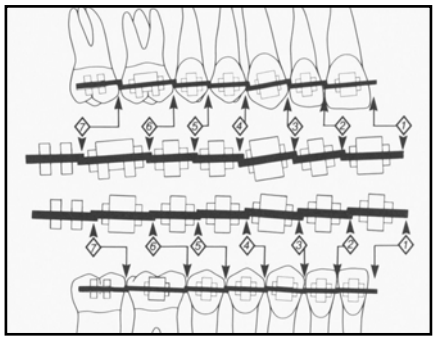
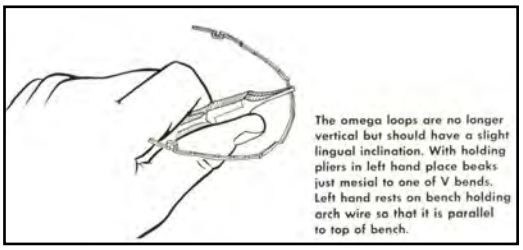
2nd Order Wire Bends- Tip (Angulation)

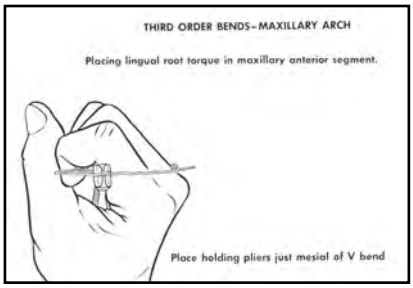






3rd Order Wire Bends Torque (Inclination)





Orthodontics based on this Edgewise system was incredibly, daunting and intimidating!

- Developed by the Father of Modern Orthodontics, Dr. Angle taught his system in an intense clinical course of 8 months and 1800 hours of study.
- He pushed for the specialty of Orthodontics.
- He selected only the best and most dedicated students.
- No general dentist would be inclined to learn ortho based on this technique because:
    - Very time consuming, too much to fit into the typical general dental office schedule.
    - Extremely difficult to learn wire bending on this level, required a lifelong commitment to the art.
    - Edgewise was best suited to be taught as a specialty

SO, again… CAN YOU UNDERSTAND HOW DIFFICULT THIS TECHNIQUE WOULD BE?

- A flat bracket, with a slot cut into it, 90° to the tooth face, every movement of the tooth would have to be bent into each archwire.
- Each subsequent archwire would have to have all the previous bends placed in it and then any new movements would also have to be incorporated.
- The orthodontist was required to become a “MASTER WIRE BENDER”
- It could take the dedication of a lifetime to master the skill.
- What GP dentist in his right mind would ever want to try to do edgewise orthodontics.
- This is where the orthodontist elite and exclusionary attitude originated and was justified! Angle didn’t just promote this idea, he demanded it of all the doctors he instructed.
- But, as the technology evolved, this all changed, except the exclusionary belief held on.

So, if something really changed, what was it?

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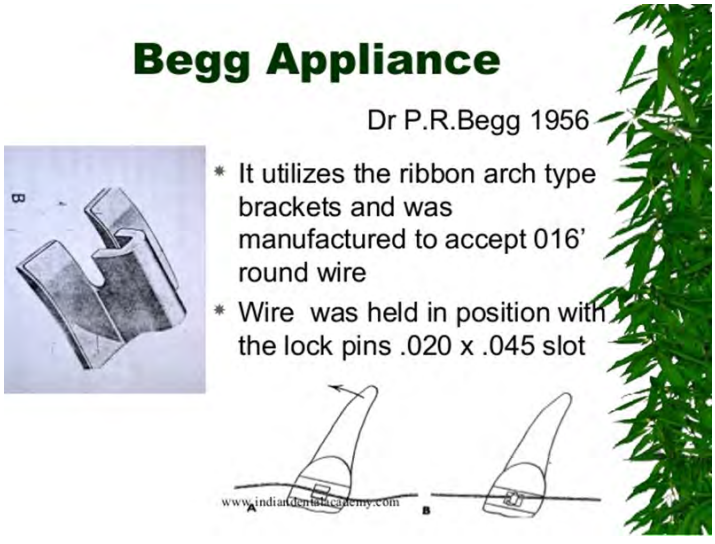
THE DEVELOPMENT OF THE STRAIGHT WIRE APPLIANCE

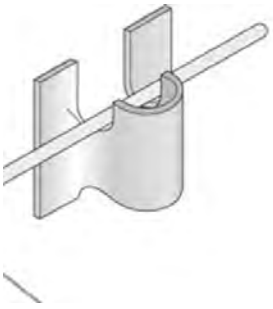
- Angle's influence continued until a student of his, Charles H. Tweed, had enough courage and objectivity to challenge Angle's non-extraction scheme.
- He used the edgewise appliance, besides making extraction of teeth acceptable for orthodontic correction, he introduced the idea of anchorage as an important part of treatment.

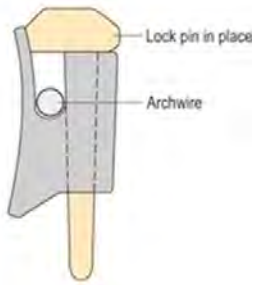
"Put your plaster on the table!"

- In 1955, Levern Merrifield, one of Tweed's most brilliant students, introduced improvements to Edgewise Appliance, making it easier to work with.

- Paul Begg reviewed Angle's views on diagnosis and then he embraced the concept of tooth extraction. He started using round arch wires in his treatments .
- He launched the Begg technique with angle ribbon appliance as a basis, but with the slot oriented to the gingival (vertical slot)
- Dr. Begg could treat many of his cases with as few as five visits over the entire treatment.







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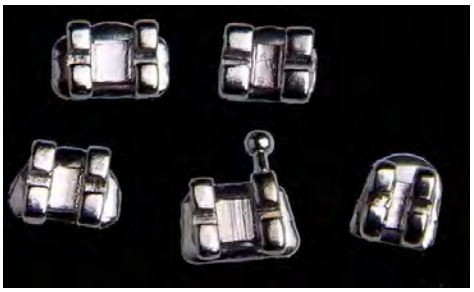
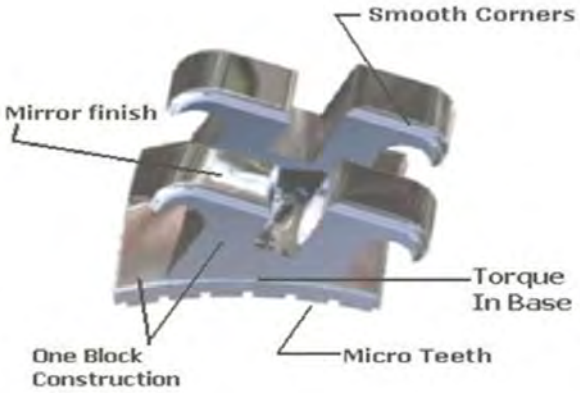
- In 1970, Lawrence Andrews, in attempt to eliminate the need for archwire bends, he developed the Straight Wire Appliance.
- The concept behind this appliance was that the brackets would move the teeth in the desired direction.



- Andrews designed a bracket system that had in its prescription angulation, inclination and in -out (built-in features) .
- "Programmed brackets"

Note: The Straight Wire appliance was initially developed for cases without extractions. However, it also started to be used for extraction cases, by incorporating the concepts of angulation, torque, and first order bend in to the brackets (first generation). Although these iterations allowed more applications, it also created many complexities and versions, creating confusion.



Roth: Straight Wire Technique

- Straight Wire Appliance became widely accepted and one of the orthodontists who collaborated in its evolution was Ronald Roth.

" If you are not part of the solution, you are probably part of the problem."

- Roth tried to avoid the difficulties and he recommended the use of a single appliance system that consisted of minimum number of brackets for both extraction and non-extraction cases. This system became the "second generation".

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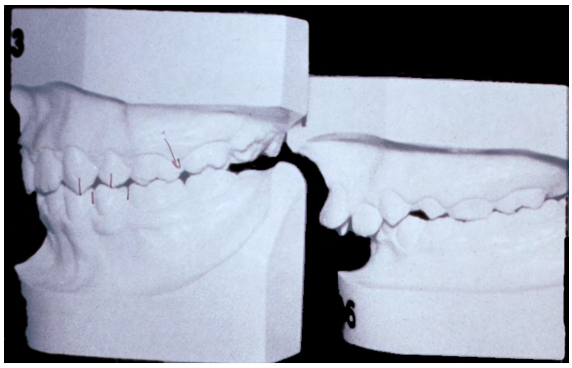
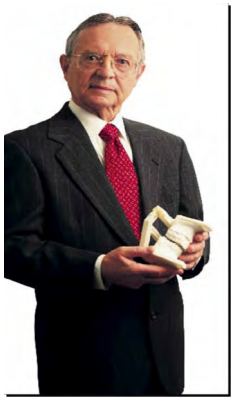
Dr. Larry Andrews "Dr. Straight Wire"

- Father of the Straight Wire philosophy
- Founder of the "A" Company

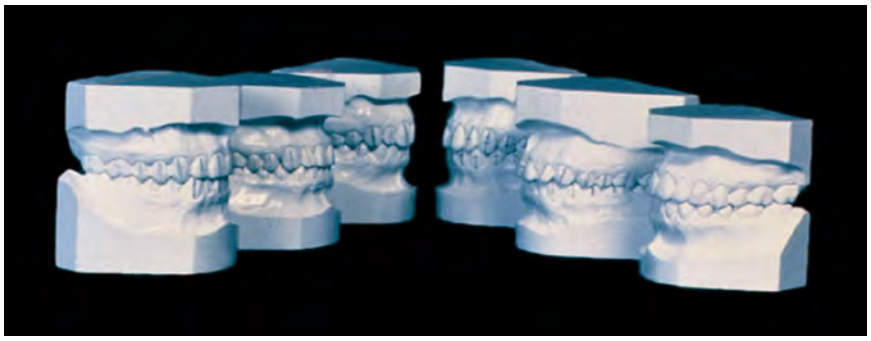
Dr. Andrews reviewed A.B.O. Cases, showing inconsistencies, prompted him to look for norms.



AFTER BEFORE



NON-ORTHODONTIC NORMALS



120 Cases evaluated that were Perfect by Nature (No orthodontic treatment needed)

Dr. Lawrence F. Andrews The Study of 120 Non-Ortho Norms

- Class I Occlusion
- Proper Crown Angulation (Tip)
- Proper Crown Inclination (Torque)
- No Rotations
- Tight Contacts
- Flat Curve of Spee

Goal of Orthodontics: To establish the Six Keys of Occlusion per Dr. Laurence Andrews

- Key I- Molar Relationship- Class I Occlusion
- Key II- Proper Crown Angulation "Tip"
- Key III- Proper Crown Inclination "Torque"
- Key IV- Free of Rotations
- Key V- Tight Contacts
- Key VI- Flat Curve of Spee

I. Molar relationship: The distal surface of the disto-buccal cusp of the upper first permanent molar occludes with the mesial surface of the mesio-buccal cusp of the lower second permanent molar.
II. Crown angulation (mesio-distal tip): The gingival portion of each crown is distal to the incisal portion and varied with each tooth type.
III. Crown inclination (labio-lingual, bucco-lingual): Anterior teeth (incisors) are at a sufficient angulation to prevent overeruption
Upper posterior teeth – lingual tip is constant and similar from 3–5 and increased in the molars
Lower posterior teeth – lingual tip increases progressively from the canines to the molar
IV. No rotations
V. No spaces
VI. Flat occlusal planes

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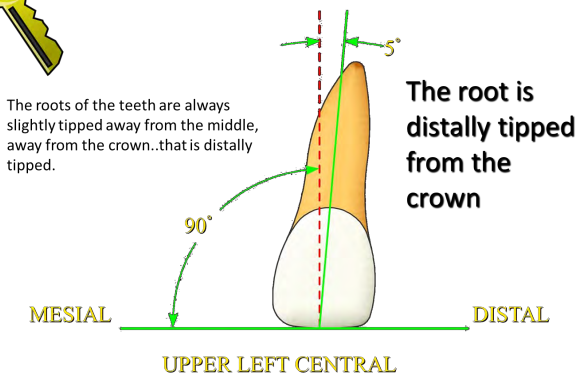
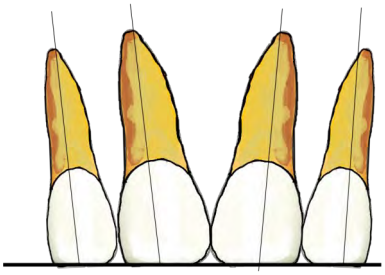
1st Key: Molar Relationship

- Upper 1st molar mesial cusp tip lines up with lower 1st molar buccal groove.
- Upper 1st molar distal buccal cusp, occludes with lower mesial buccal cusp of 2nd molar.

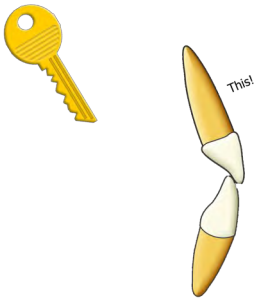
2nd Key: Crown Tip (Angulation)



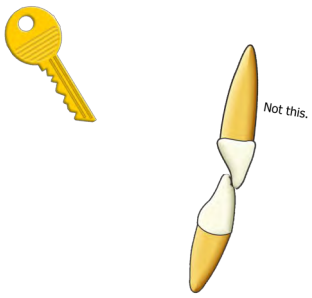
Again, the 2nd Key, TIP, means that all the roots are moved away from the midline, distal to their crowns. Like this:



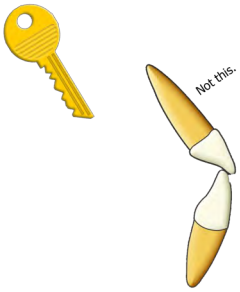
3rd Key: Crown Torque (Inclination)



Note: Lingual root torque

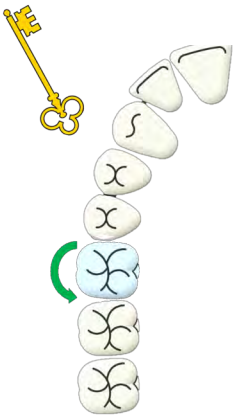


Note: Lingual root torque

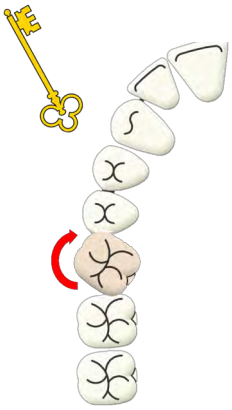


Note: Lingual root torque

4th Key: Free of Rotations



Green arrow shows the correction by rotating the molar distally, respecting 4th Key.



Red arrow shows a mesially rotated molar taking up space, which would cause crowding.

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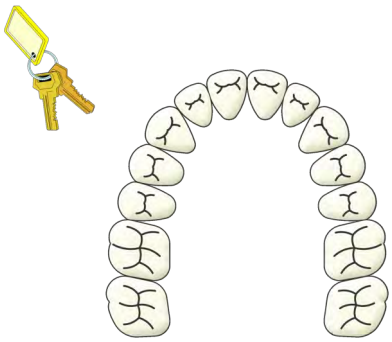
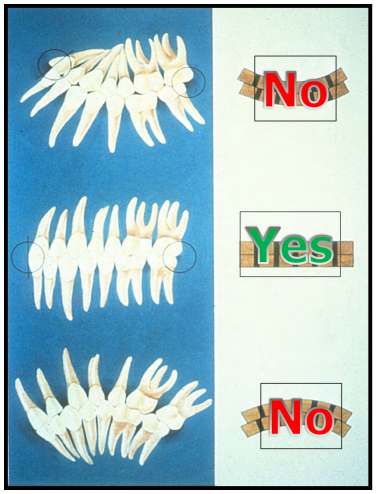
5th Key: Tight Contacts



Correct Spacing: Floss should snap through all contacts

6th Key: Flat Curve of Spee



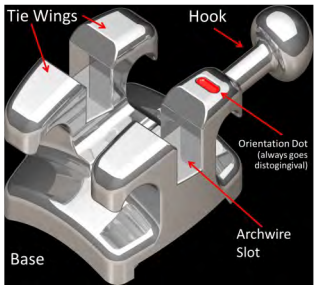
Concave curve of spee

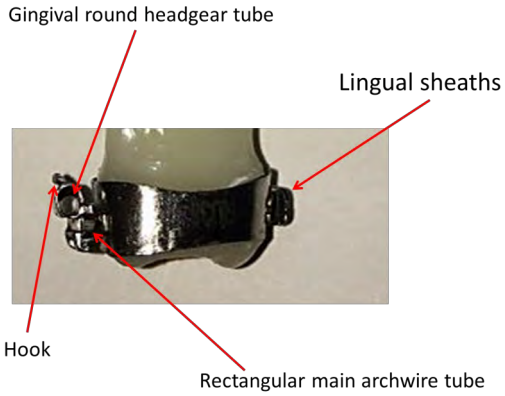
Flat curve of spee

Convex curve of spee

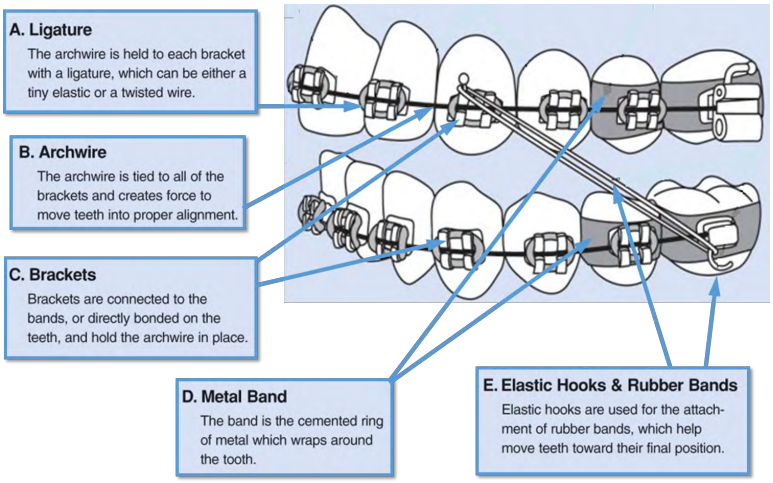
The Nuts and Bolts

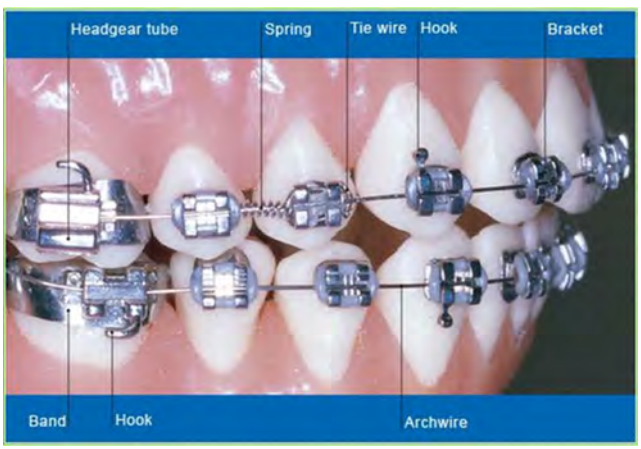
The Basic Straight Wire Appliance





Brackets, Bands and Archwires





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Based on the observations that resulted in the 6 Keys, Dr. Andrews developed a programmed bracket that incorporated all of the 1st, 2nd & 3rd order movements that he determined to be "ideal" in the perfect dental case.

This programmed orientation that Andrews imparted to each bracket is called the prescription of the bracket.

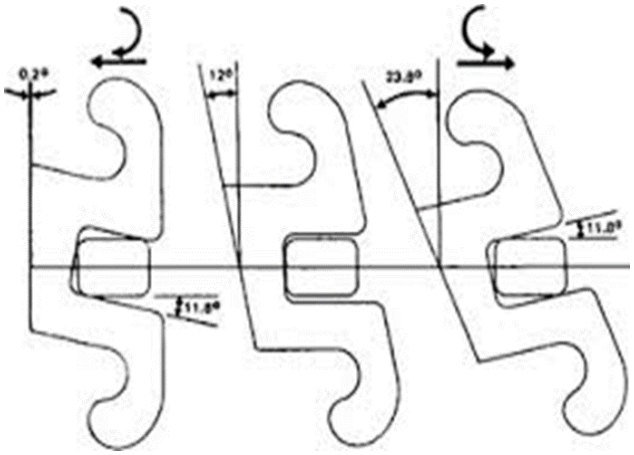
The RX.

Goals:

- To fill up the bracket with an archwire
- This employs the RX of the bracket
- Which applies 1st, 2nd, 3rd order moments of force to the teeth

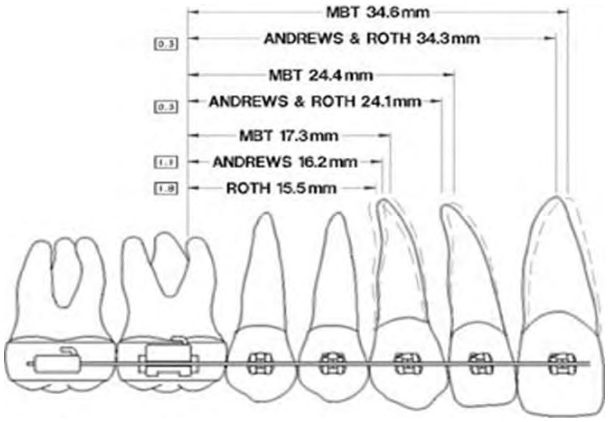
This results in a perfect arch form and ideal orientation of the teeth in 3 planes of space

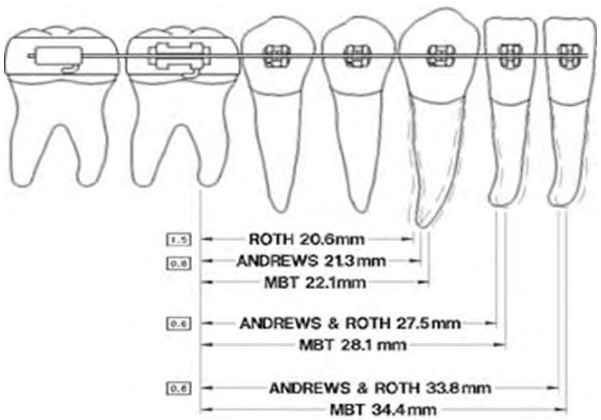
No special wire bending skills required



A Straight Wire Series:

- No special technical skills or knowledge required – **it is in the bracket!**
- Rx is in the Bracket – fill up the bracket – voila'!!
- **Straight teeth!!**
- 1st (In/Out), 2nd (Up/Down), 3rd (Torque) order bends are in the RX (slot)
- Series begins with light round wire
- Progress through a series of larger round wires
- Increase to rectangular wires
- Finish in a large rectangular archwire – 3rd order





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We use brackets with a Rx that replaces the need for wire bending and we place in them, straight wires, in a series.

No significant wire bending….hence the name, “Straight Wire Series”.

A Typical Class I Case…

BEFORE

Small Light Round Wires….

Bigger Round Wires….

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Small rectangular wires...

Bigger rectangular wires...

Bigger - still rectangular wires...

The bracket Rx is continuously expressed...

Built into the bracket slots...

Before

After

And at the finish, a dentition changed to reflect Andrews' Six Keys to Occlusion...

Before

Before

After

After

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Before

Before

After

After

A Typical Class I Case… COMPLETED

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Another Case….Class II Phase I thru Phase II

Phase II Complete

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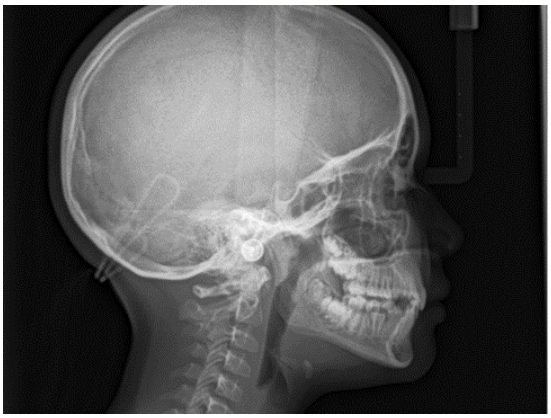

Age 11

Here is a Phase II case (treating to Andrews' 6 Keys) that starts in mixed dentition with Utility Arch Wires (UAW) and ends in a Straight Wire Series (SWS).

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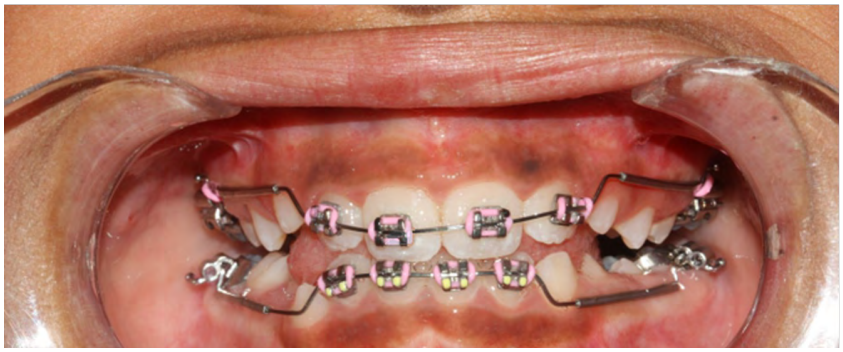
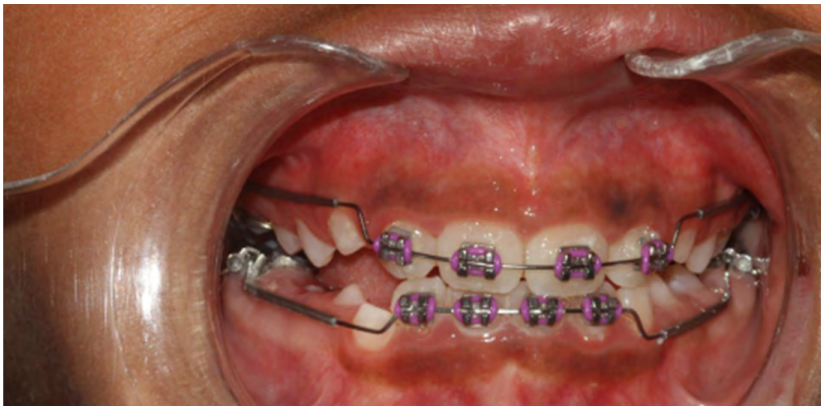
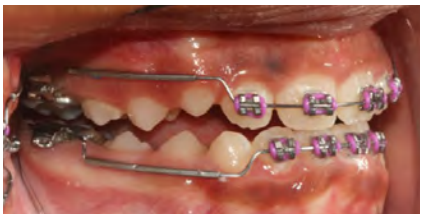
3-24-2015

Utility Arch Wires in mixed dentition or when the premolars aren't erupted



4-22-2015





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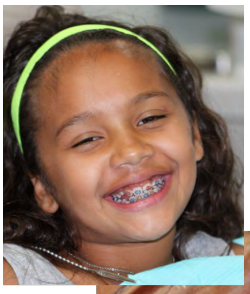
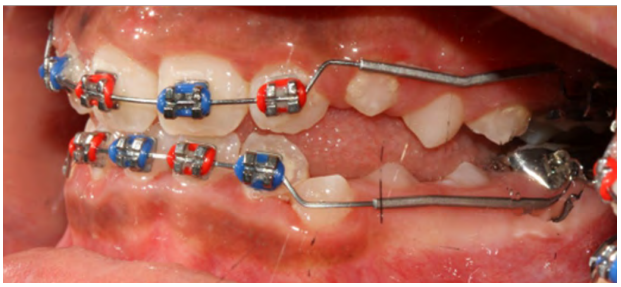
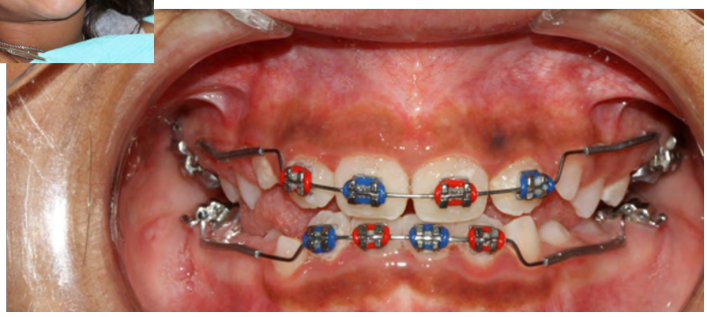
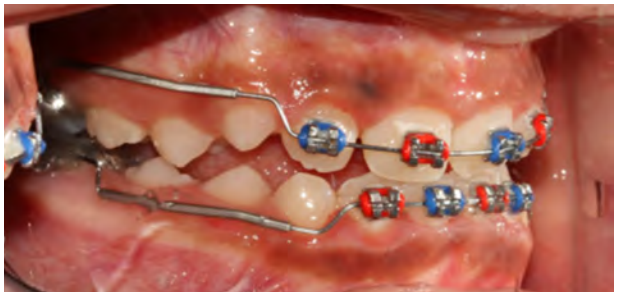
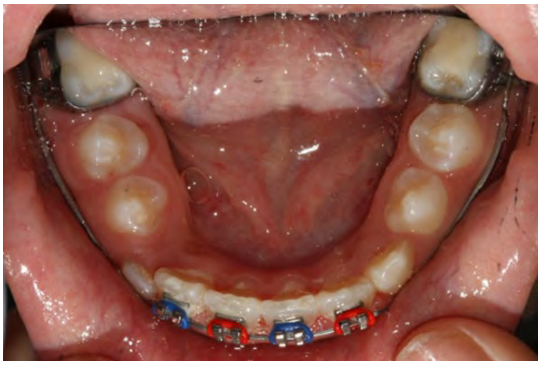


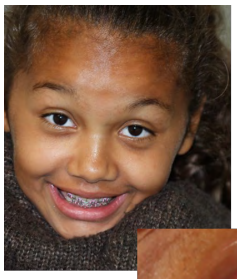
6-1-2015





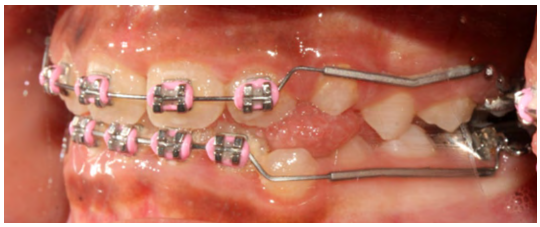


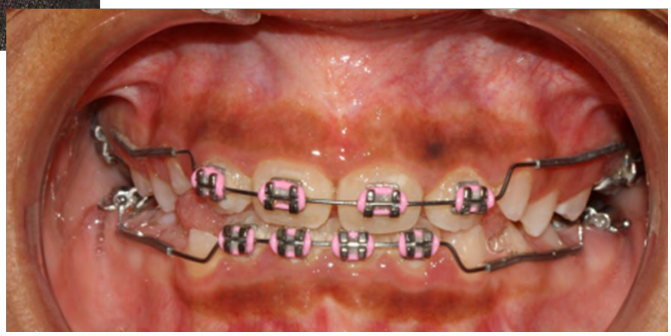


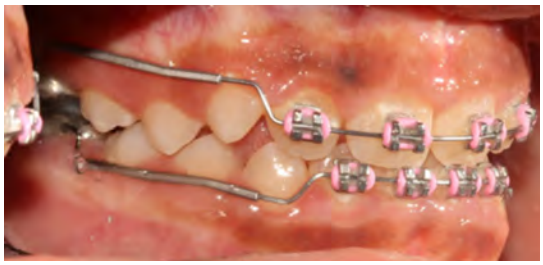


8-10-2015

Getting the Anteriors Level







Getting the Anteriors Open

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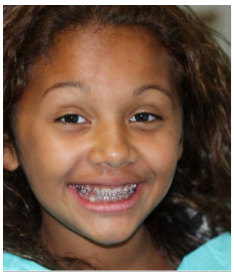
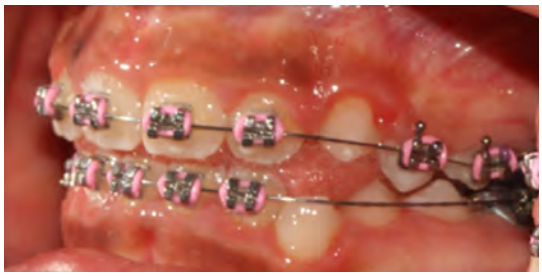
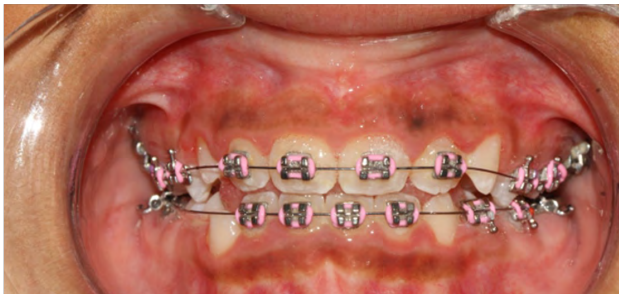
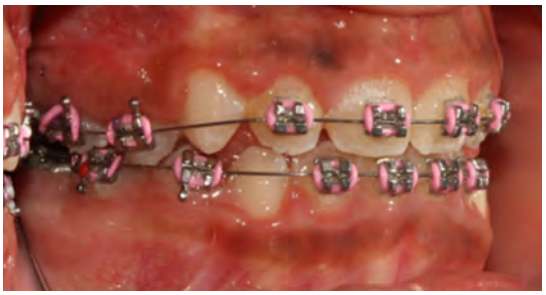


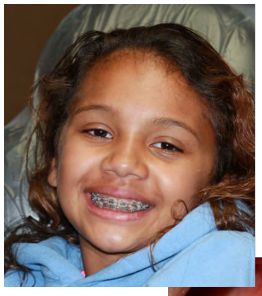
11-3-2015

The SWS begins with Light
Flexible Round Wires

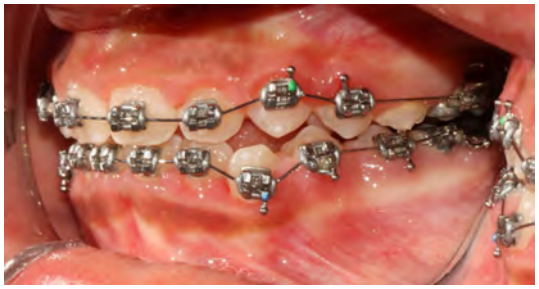








2-29-2016



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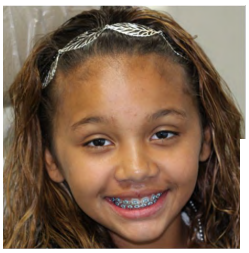
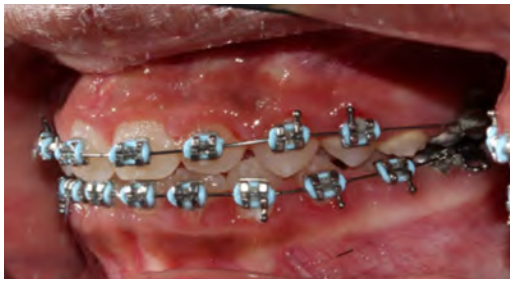
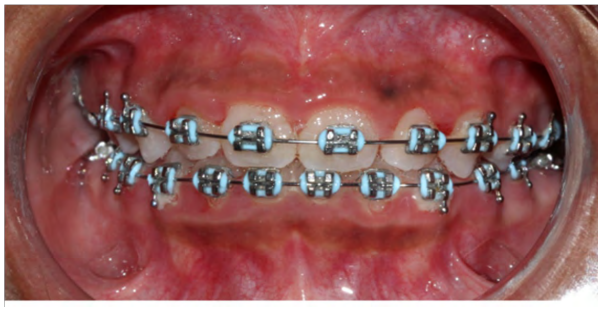
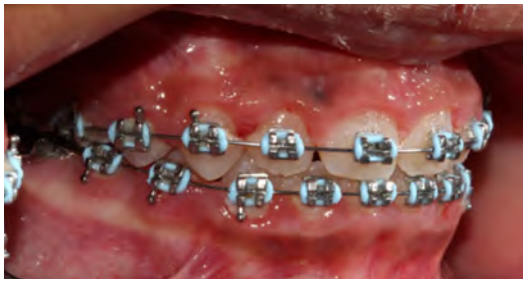


3-28-2016

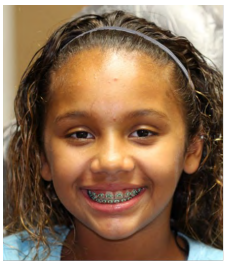
Bigger, Less Flexible Round Wires filling the Bracket Slot





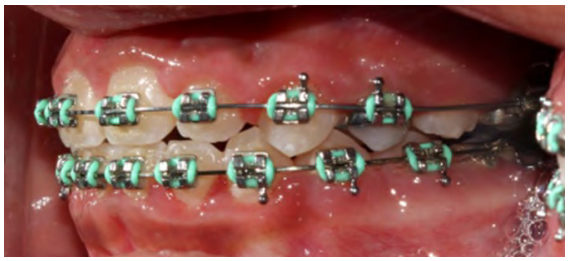


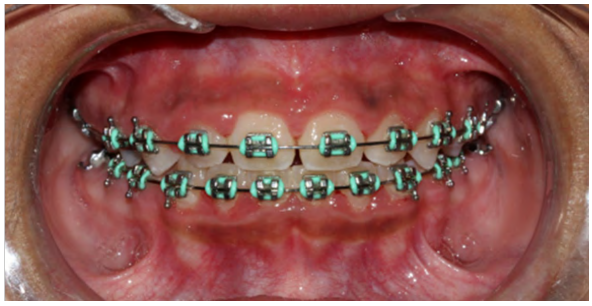
Notice the AW Beginning to Express the Rx and Shape the Arch Form



9-7-2016

Bigger Rectangular Wires





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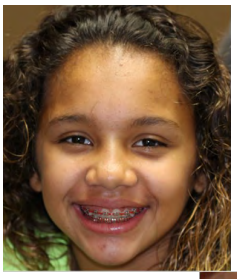

11-26-2016

The Biggest Rectangular Wires

1-19-2017

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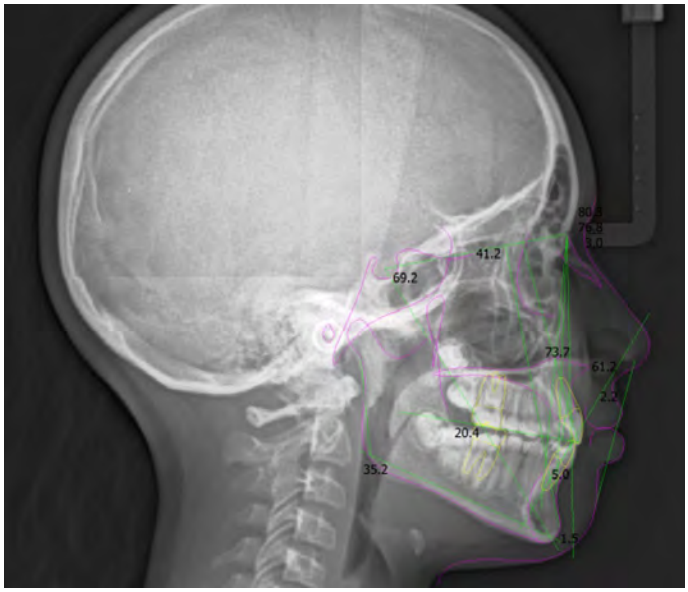

Group/Measurement	Value	Norm	Std Dev	DevNorm	
Skeletal					
SNA (º)	80.3	82.0	4.0	-0.4	
SNB (º)	76.8	80.0	4.0	-0.8	
ANB (º)	**3.5**	**2.0**	**2.0**	**0.8**	
SND (º)	73.7	76.0	4.0	-0.6	
SN - GoGn (º)	**35.2**	**32.0**	**5.0**	**0.6**	
Occ Plane to SN	20.4	14.0	3.0	2.1	**
Y-Axis (SGn-SN)	**69.2**	**67.0**	**3.0**	**0.7**	
Interincisal Angle	133.5	132.0	2.0	0.8	
Gonial/Jaw Angle	122.3	122.0	4.0	0.1	
U1 - NA (º)	14.3	22.0	2.0	-3.8	***
L1 - NB (º)	28.6	25.0	2.0	1.8	*
U1 - NA (mm)	2.2	2.0	2.0	0.1	
L1 - NB (mm)	5.0	2.0	2.0	1.5	*
Pog - NB (mm)	1.5	2.0	2.0	-0.2	
Wits Appraisal	**1.3**	**-1.0**	**1.0**	**-0.3**	
S-L (mm)	41.2	51.0	2.0	-4.9	****
Soft Tissue					
Upper Lip - S Line (mm)	**0.7**	**0.0**	**2.0**	**0.3**	
Lower Lip - S Line (mm)	**3.2**	**0.0**	**2.0**	**1.6**	*

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Before

After

Before

After

Before

After

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Before

After

Before

Before

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After

Before

Before

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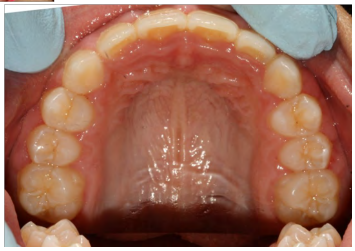

After

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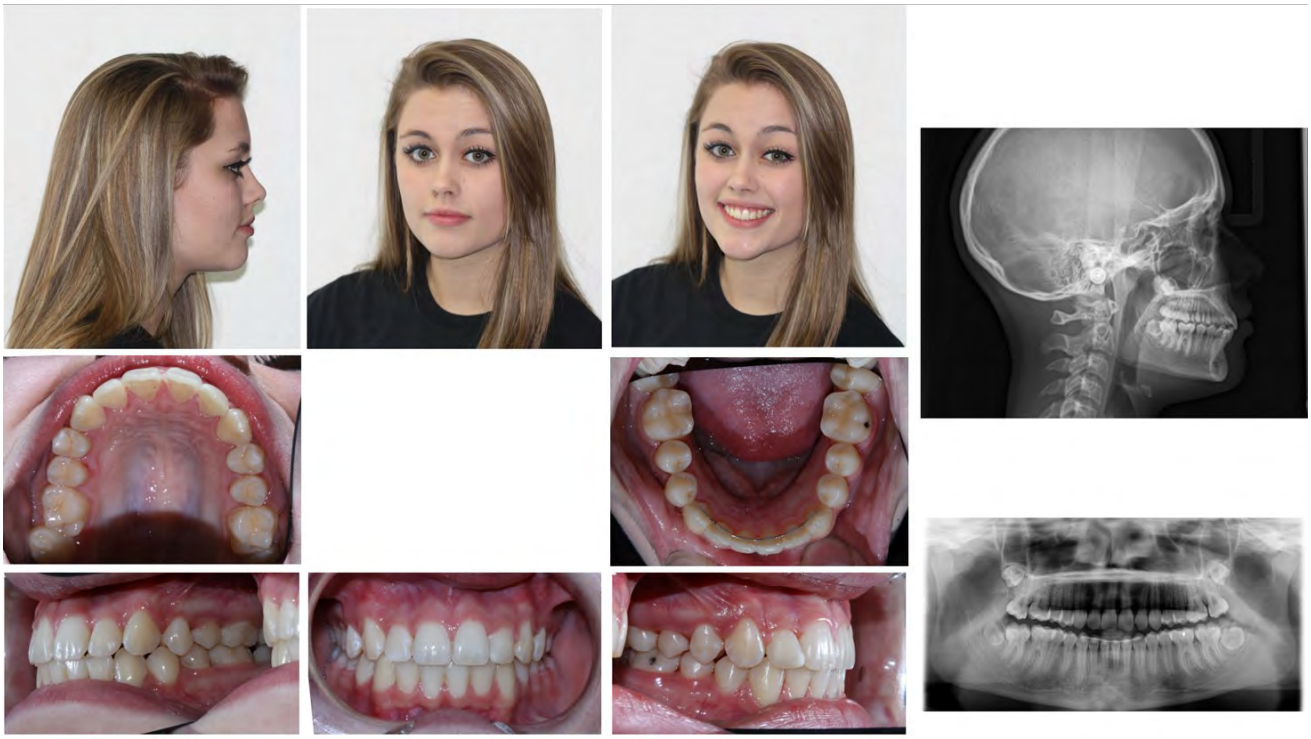
BEFORE

AFTER



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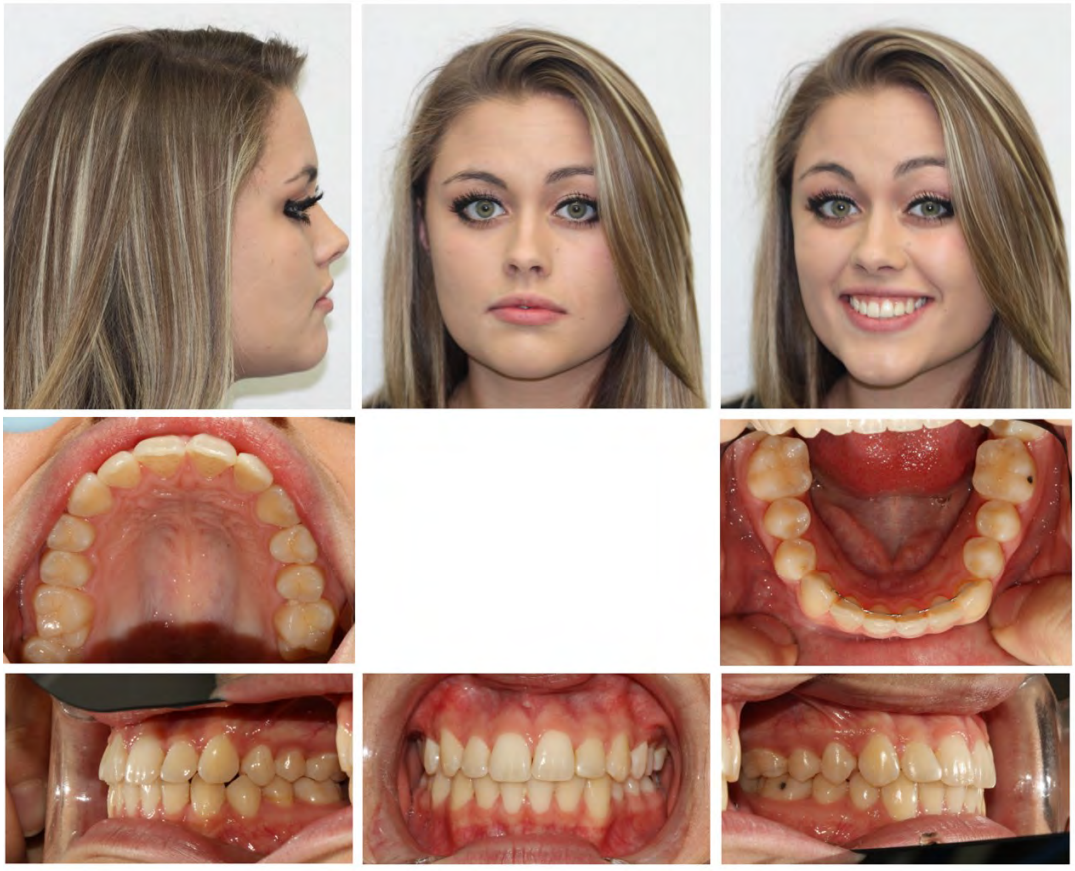
2 YEARS POST



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BEFORE **AFTER**

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TYPICAL CASE

BEFORE

AFTER

BEFORE

AFTER

BEFORE

AFTER

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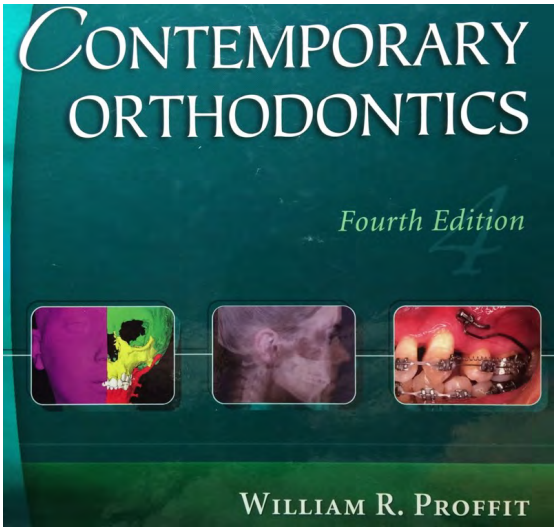
In this book, which is one of the orthodontic specialist bibles, Dr. William R. Proffit says,

"In orthodontics as in all areas of dentistry, it makes sense that the less complex cases would be selected for treatment in general or family practice, while the more complex cases would be referred to a specialist.

The only difference in orthodontics is that traditionally, the family practitioner has referred a larger number of orthodontic cases. In family practice, an important issue is how you rationally select patients for treatment."



So, if Dr. Proffit concedes that GPs should be treating the simpler cases, commensurate with his or her skills and training, then you have to ask:

"When and where am I to get the diagnostic knowledge to discern which patients I treat and which patients I refer."

and

"Where am I going to get the skills to treat the patients that I should be delivering GP orthodontic services that Dr. Proffit is referencing?"

Dr. Brad Williams

I may be reached anytime through:

bwilliamsortho@gmail.com

Cell phone 918 645-1928

The AOS is a non-profit organization that has been educating and supporting GP's & Pediatric Dentists just like you, to deliver these services to their patients. I have been a member of this organization since 1983 and I have been teaching Basic & Intermediate Orthodontics for the AOS since 2010.

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My 5-Session Courses Include for members in good standing:

- Lifetime Mentoring at No Charge
- Ongoing Support at No Charge
- Monitor Following Year at No Charge with the full CE Credit

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My website is a great place to find information about courses and support to successfully add orthodontics to your GP or Pediatric practice.

www.williams*GP*orthodontics.com

Check out our Facebook Secret Group

Send a friend request to Teresa Berry Williams for an invitation into the Secret Group.

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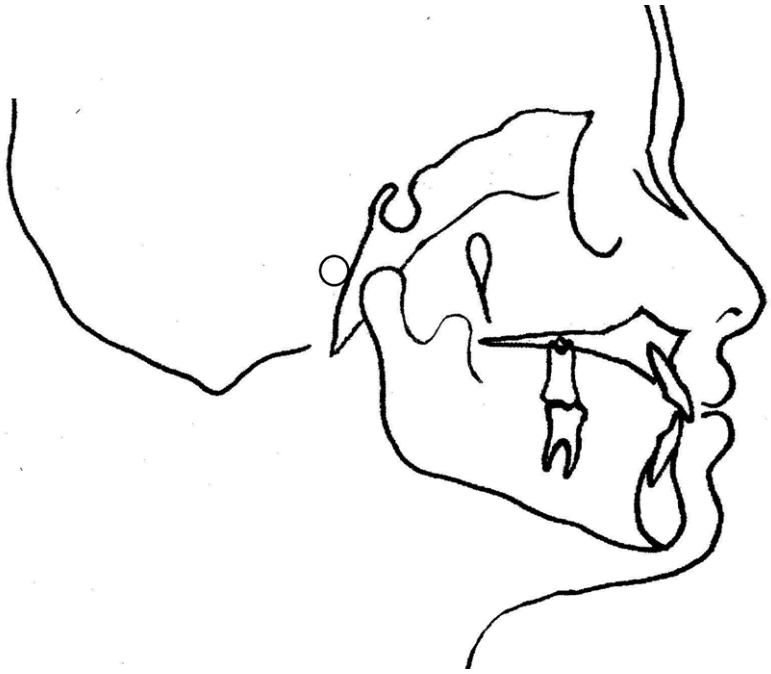
Williams Intro Analysis

Cephalometric Landmarks

Basic Course



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CEPHALOMETRIC INTRO ANALYSES

There are too many cephalometric analyses to count. Over 800 are available through Dolphin alone. Downs, Steiner, Tweed, Ricketts, Wits, McNamara, Sim, Gerety, Jackson and this intro analysis are just the tip of the iceberg.

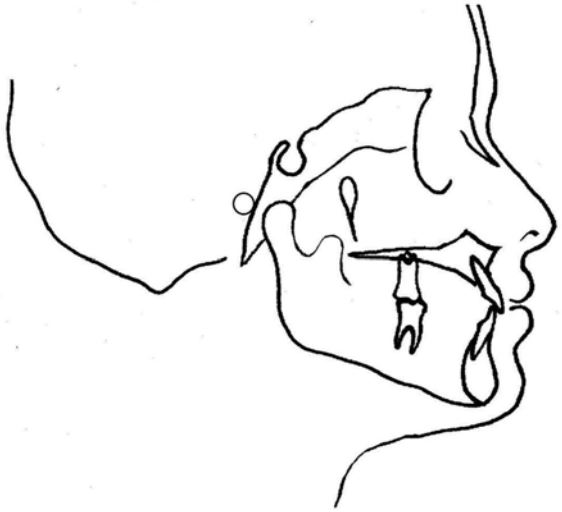
- A Ceph analysis is an absolute necessity in the orthodontic diagnosis process but it isn't the most important part of that data base.
- In the past, Cephalometry was the cornerstone to the orthodontic diagnoses; some orthodontists even advocated treating to the cephalometric norms.

- Today we know that many cases when finished will not have cephalometric measurements, which fit the norms. However, they may look great and be very stable.
- Today, our culture dictates that we treat according to esthetics and well-balanced faces. Most of the time, you will find that when you achieve good esthetics, the final cephalometric values will be within the normal ranges.
- Again, the ceph analysis is standard of care diagnostic information and the practitioner must have a working understanding of basic ceph to properly diagnose and treatment plan cases.
- With this in mind, we will review basic anatomical landmarks, trace several head films as a group, diagnose, and treatment plan. This will be integrated into cases we present throughout these five sessions.

Cephalometric Landmarks Used in my Intro Analysis

- These are the essential landmarks you need to trace in order to do the Intro analysis required for diagnosis.
- Just 9 points, 6 planes allowing you to extract 3 angular and 3 linear measurements.
- Just 6 bits of data for the data base. Not that complicated!

LATERAL CEPHALOMETRIC VIEW



- The following are the necessary landmarks, points and planes used in the analysis.
- I have omitted all the points used to describe the soft tissue landmarks necessary to use a computer program.
- If you are tracing by hand, the soft tissue and hard tissues are simply traced and the teeth are drawn w/o attention to a long list of points used to prompt the computer.

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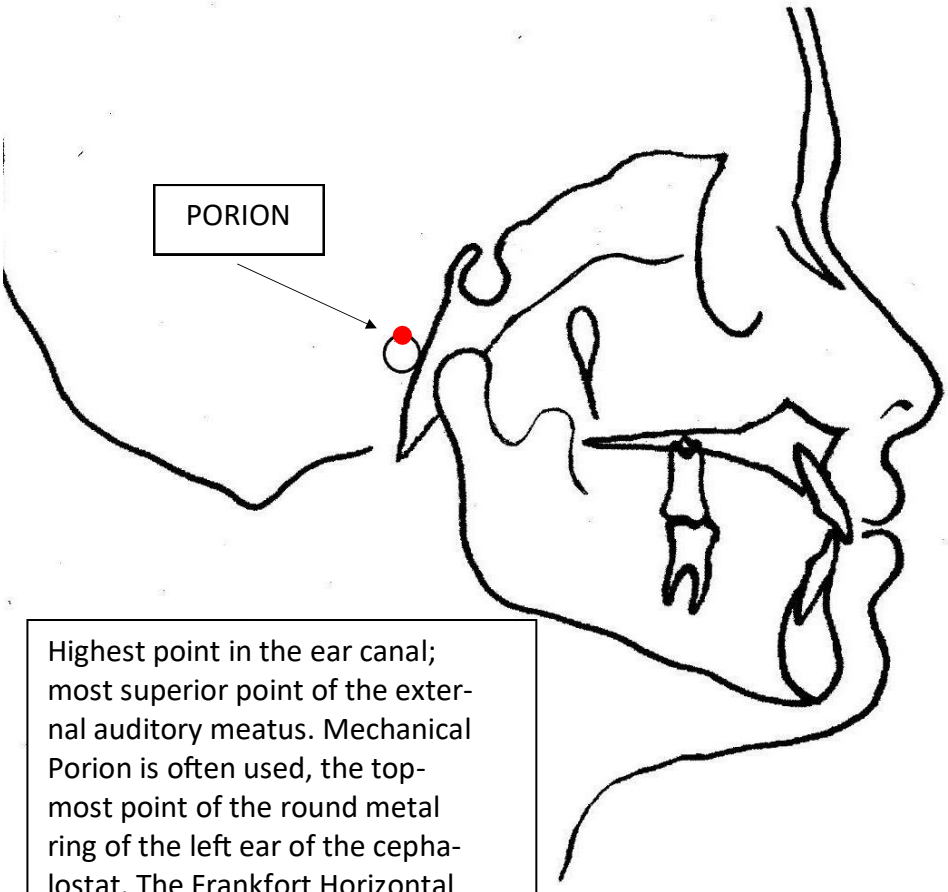
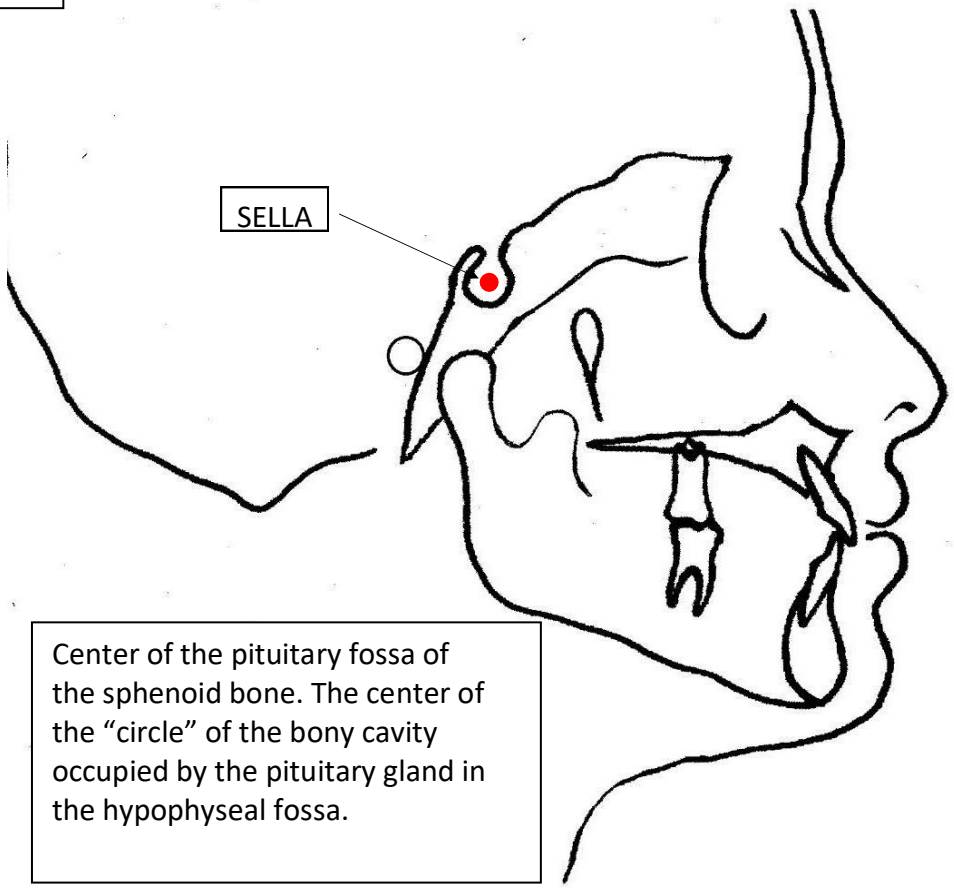


Highest point in the ear canal; most superior point of the external auditory meatus. Mechanical Porion is often used, the topmost point of the round metal ring of the left ear of the cephalostat. The Frankfort Horizontal Plane (FH passes through Porion posteriorly).



Center of the pituitary fossa of the sphenoid bone. The center of the "circle" of the bony cavity occupied by the pituitary gland in the hypophyseal fossa.

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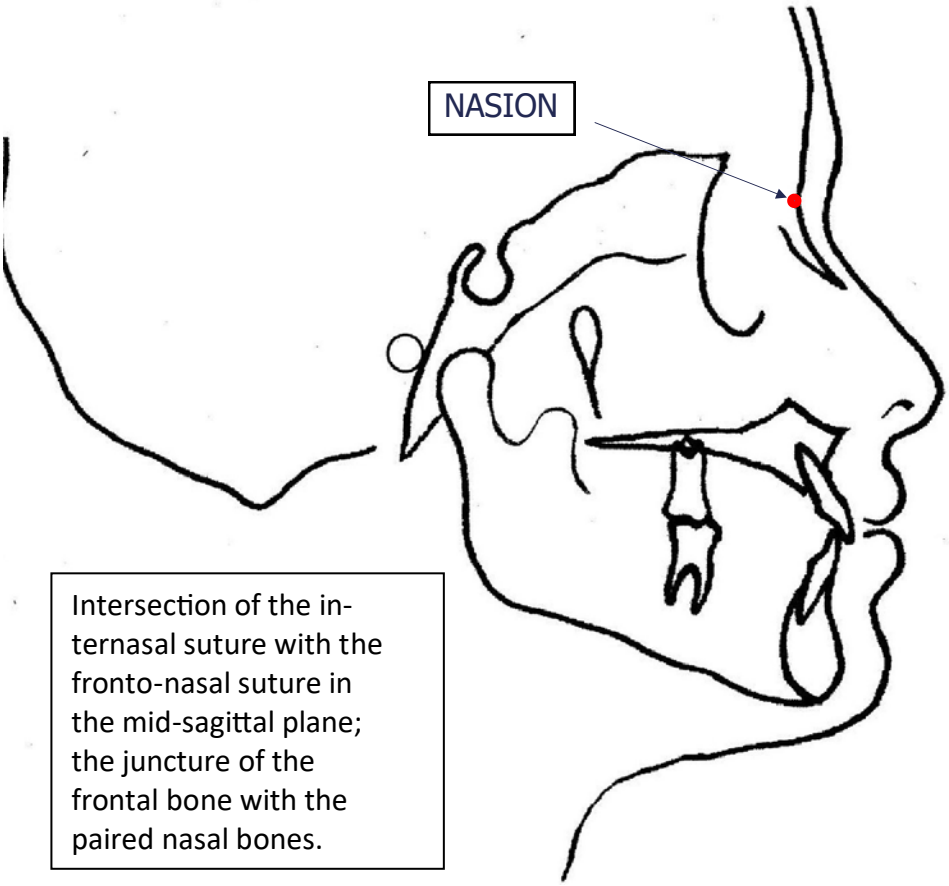
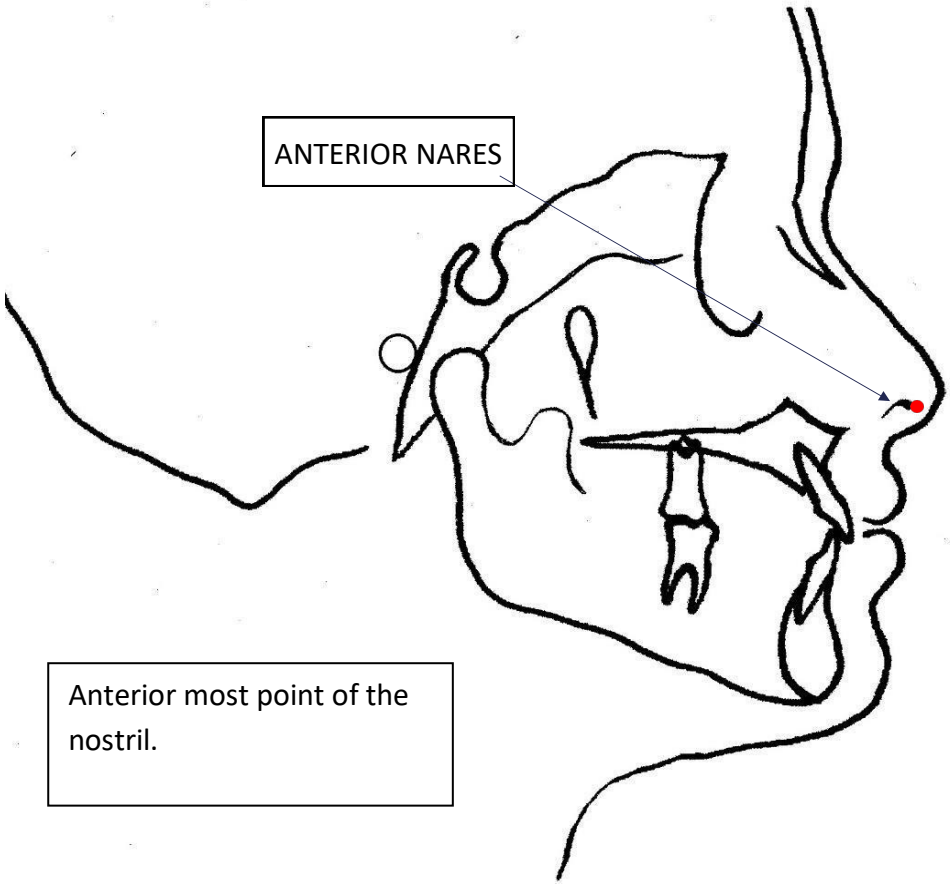


Intersection of the internasal suture with the fronto-nasal suture in the mid-sagittal plane; the juncture of the frontal bone with the paired nasal bones.



Anterior most point of the nostril.

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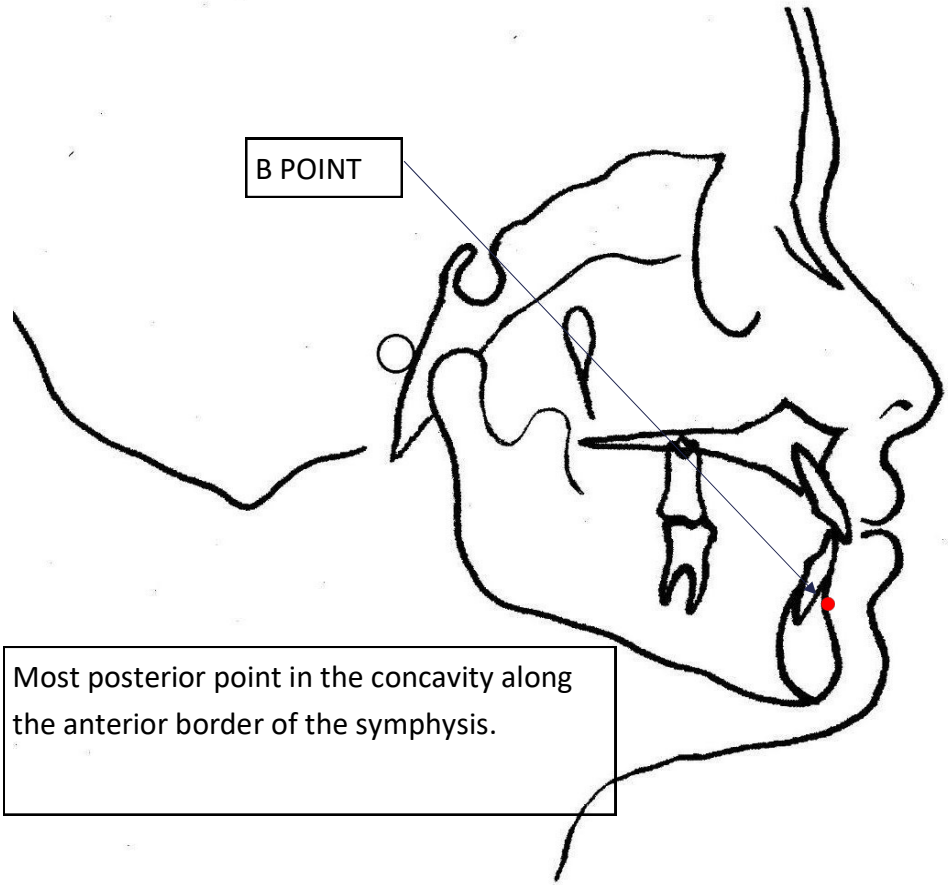

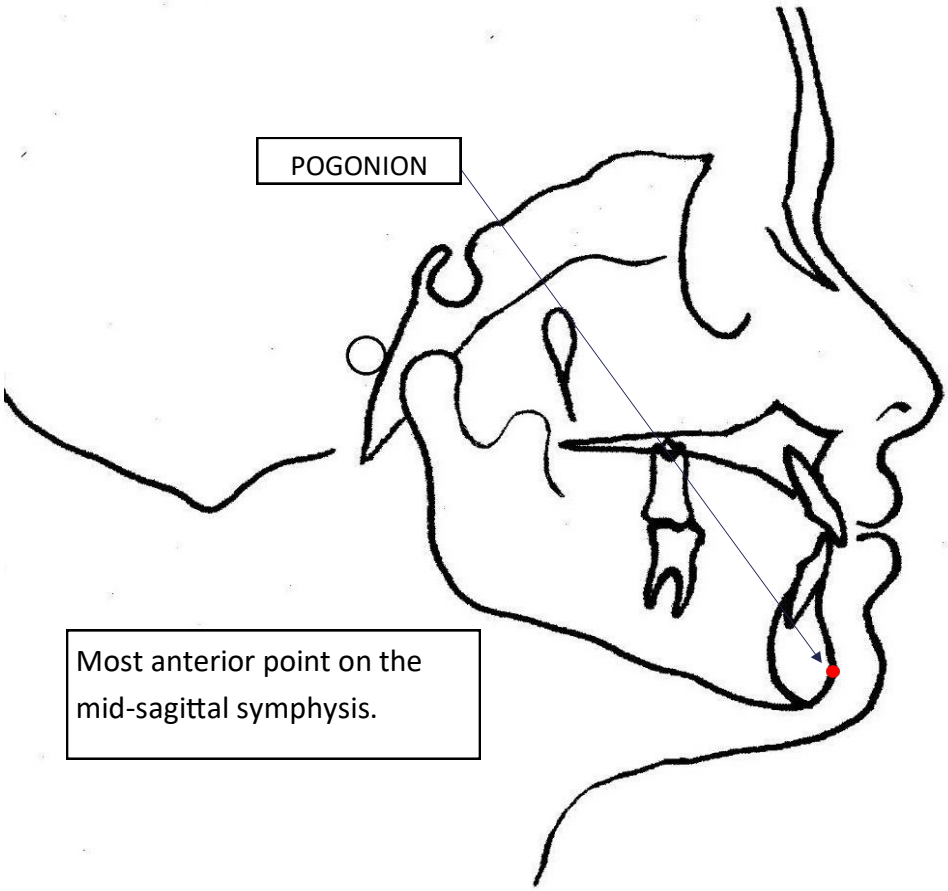

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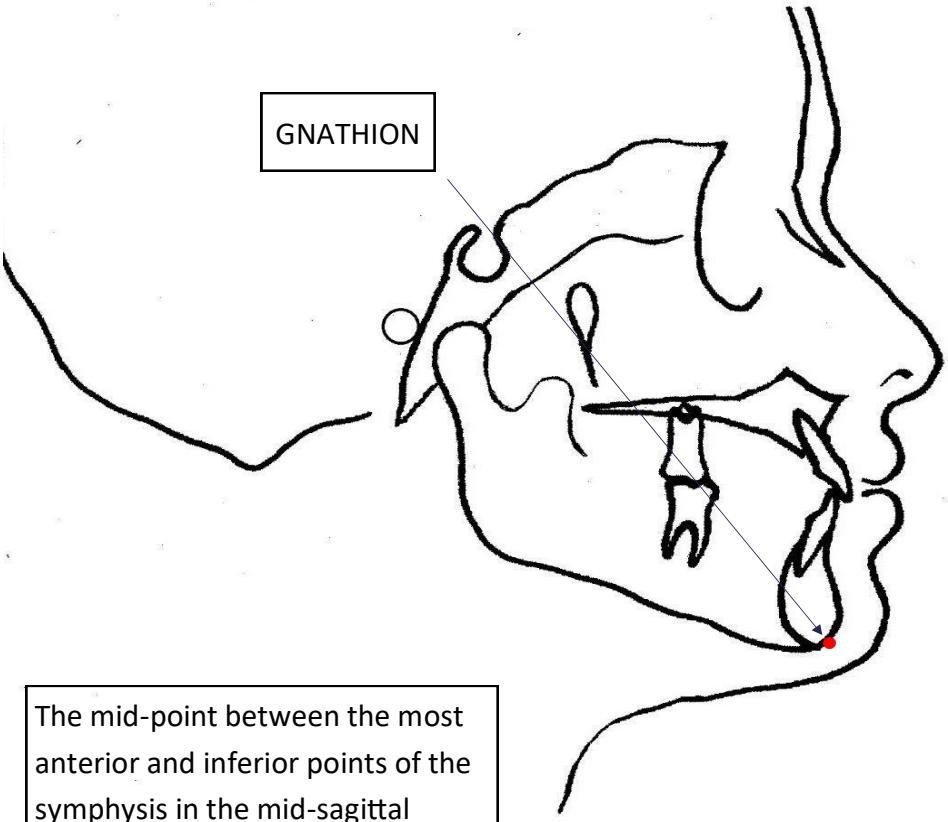
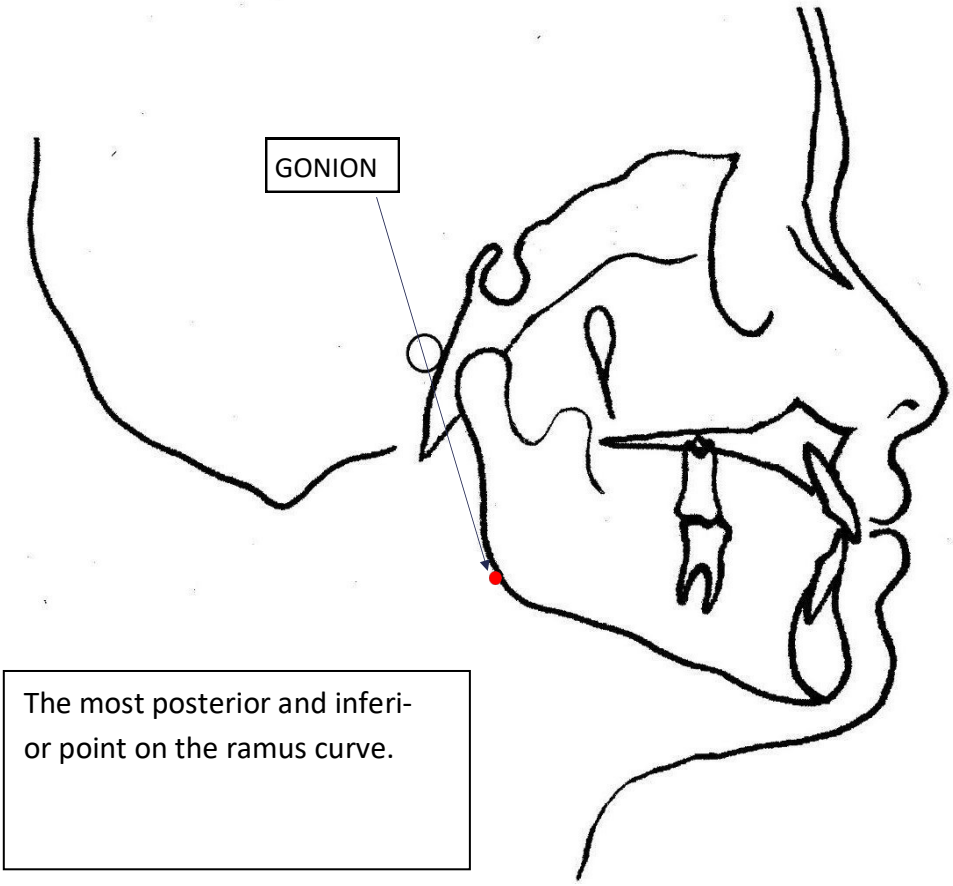


The mid-point between the most anterior and inferior points of the symphysis in the mid-sagittal plane.



The most posterior and inferior point on the ramus curve.

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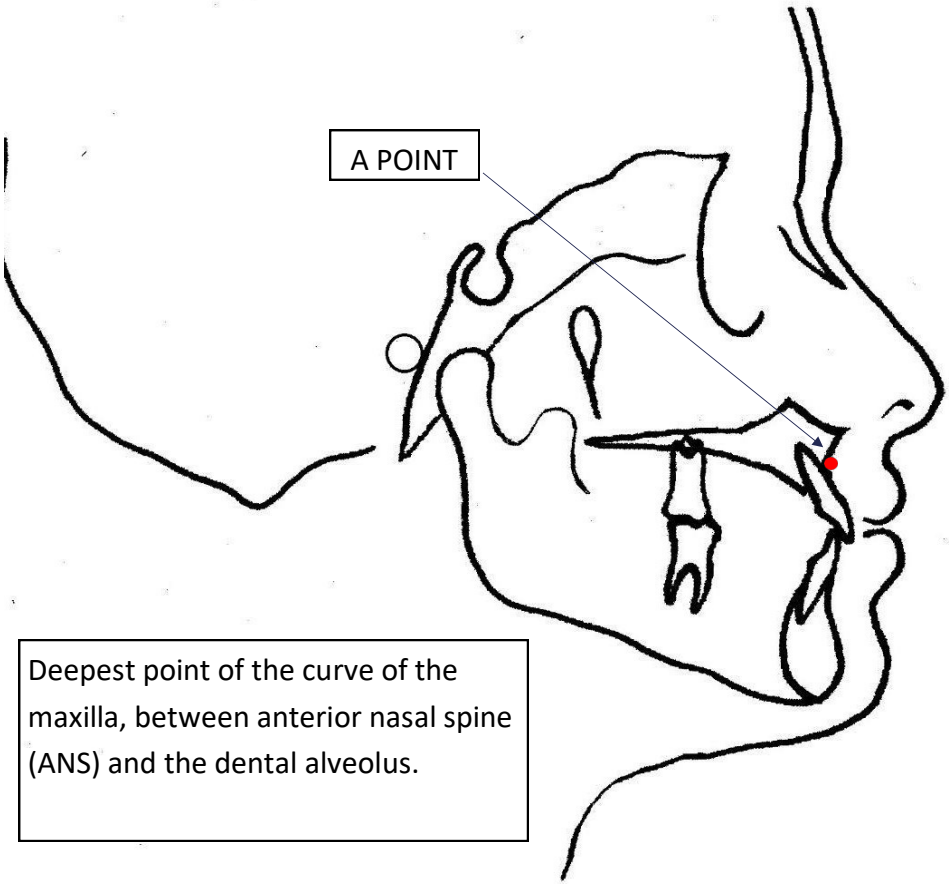
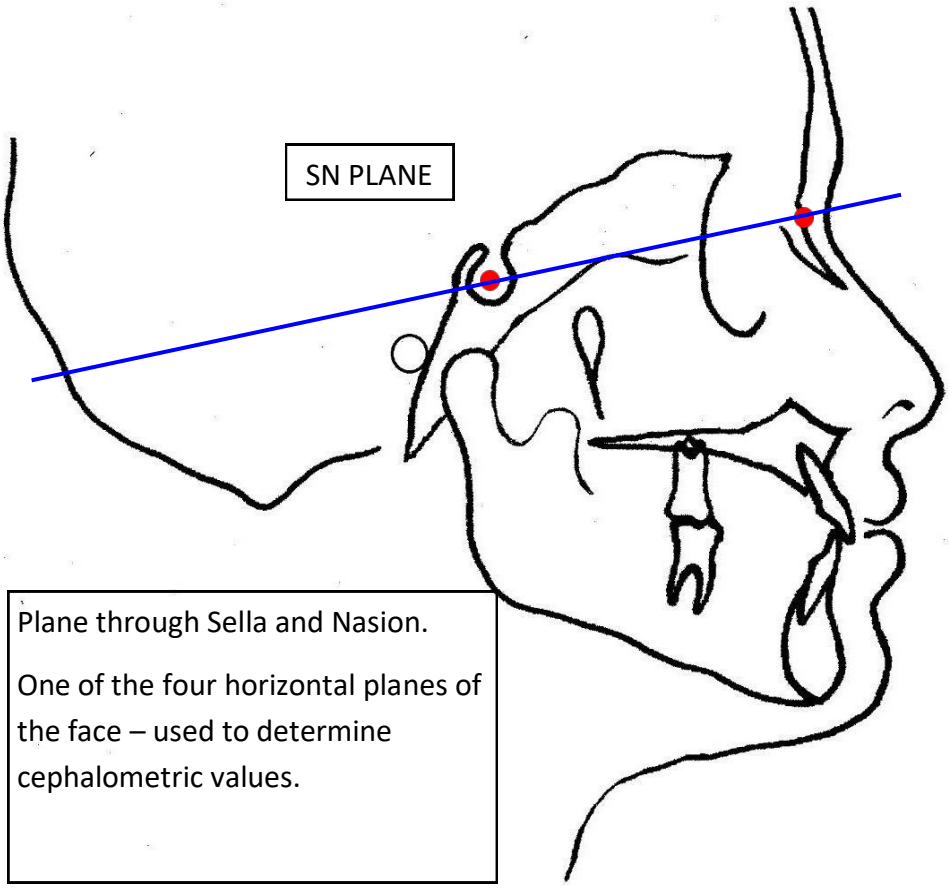


Deepest point of the curve of the maxilla, between anterior nasal spine (ANS) and the dental alveolus.



Plane through Sella and Nasion.

One of the four horizontal planes of the face – used to determine cephalometric values.

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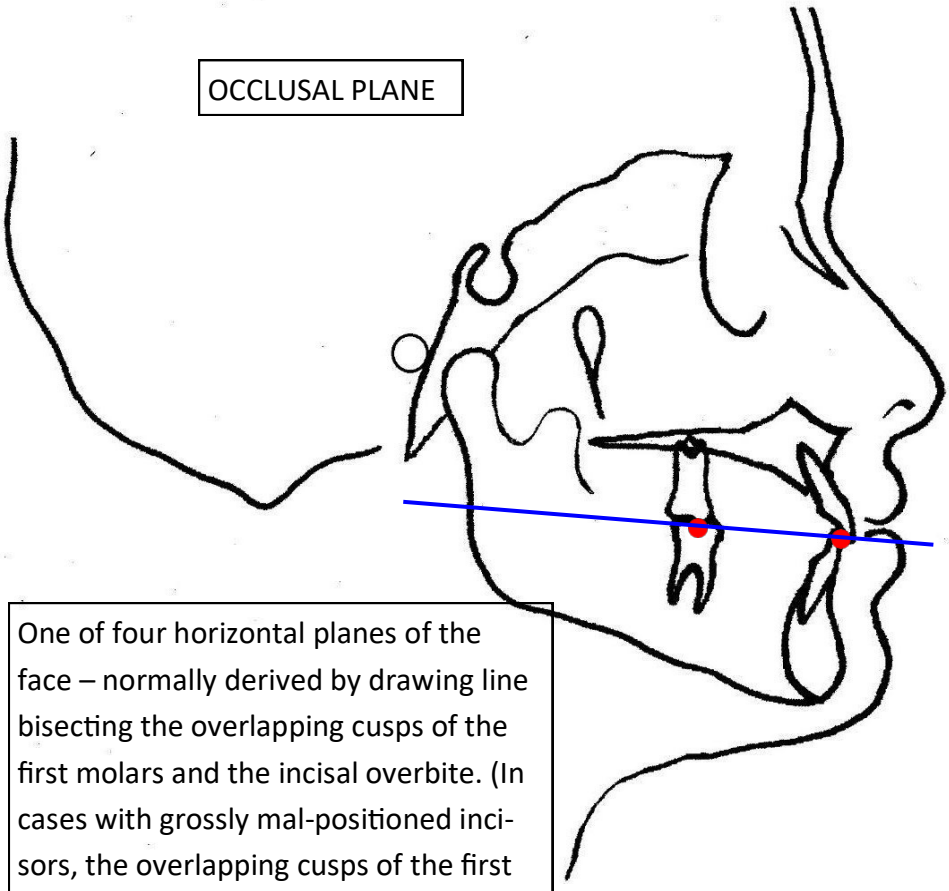
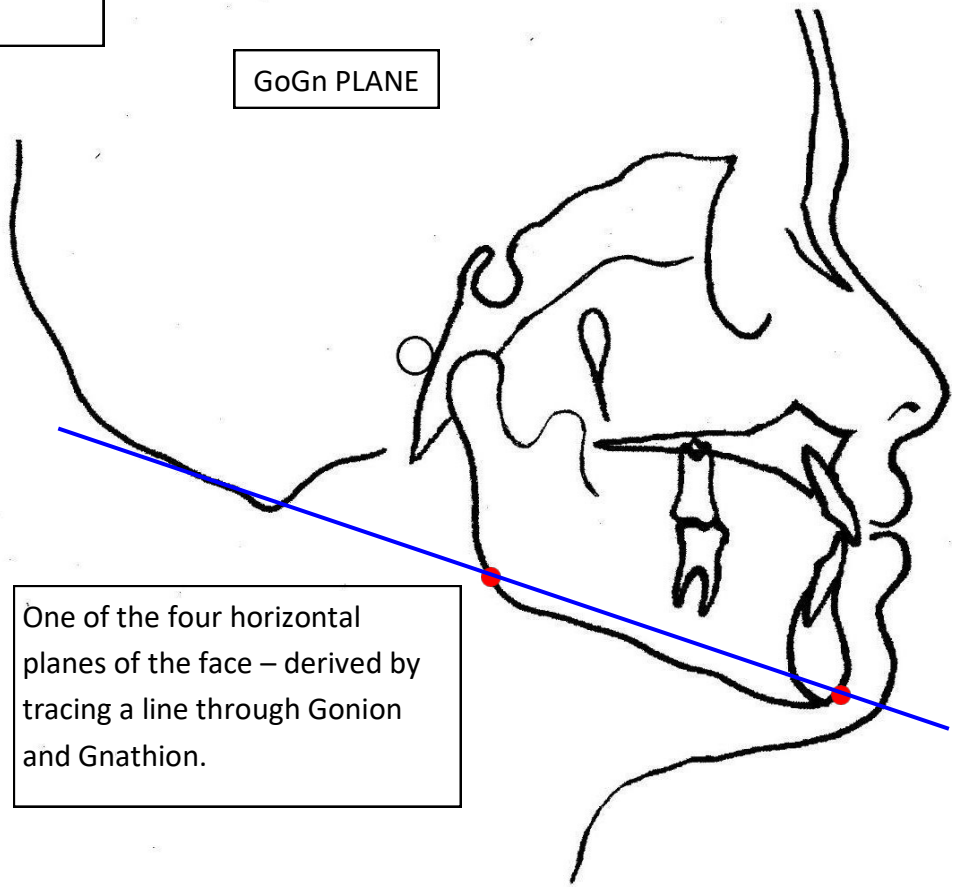
OCCLUSAL PLANE



One of four horizontal planes of the face – normally derived by drawing line bisecting the overlapping cusps of the first molars and the incisal overbite. (In cases with grossly mal-positioned incisors, the overlapping cusps of the first premolars are substituted for the incisal overbite.)

GoGn PLANE



One of the four horizontal planes of the face – derived by tracing a line through Gonion and Gnathion.

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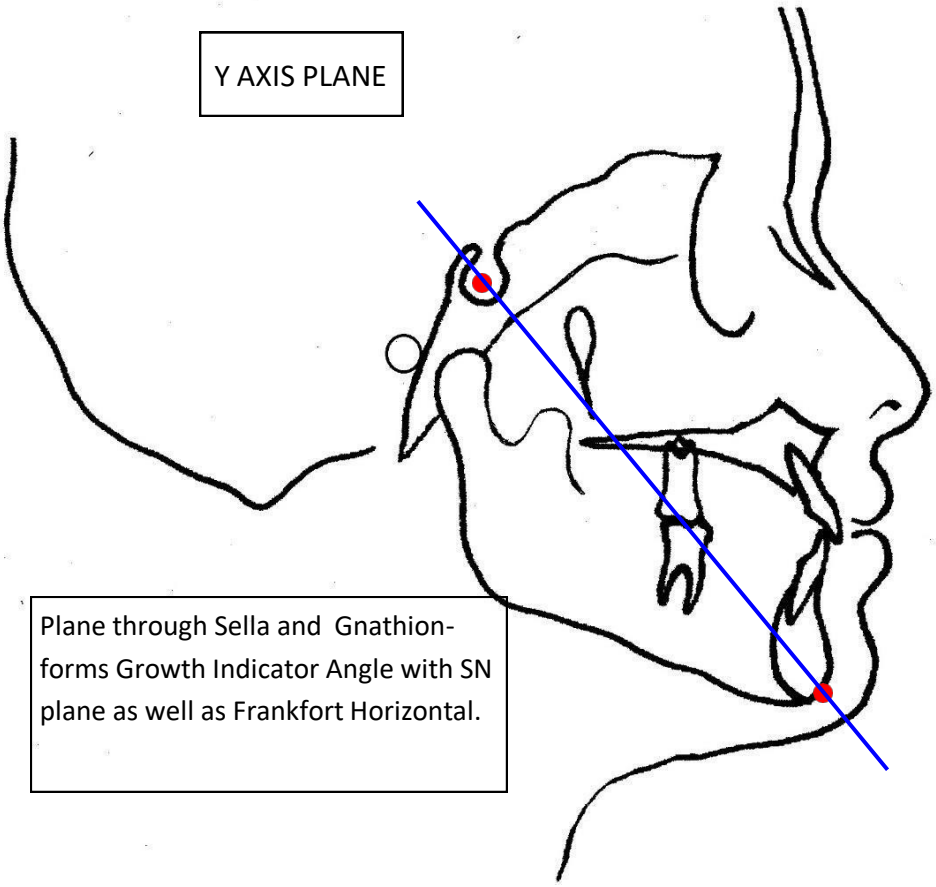
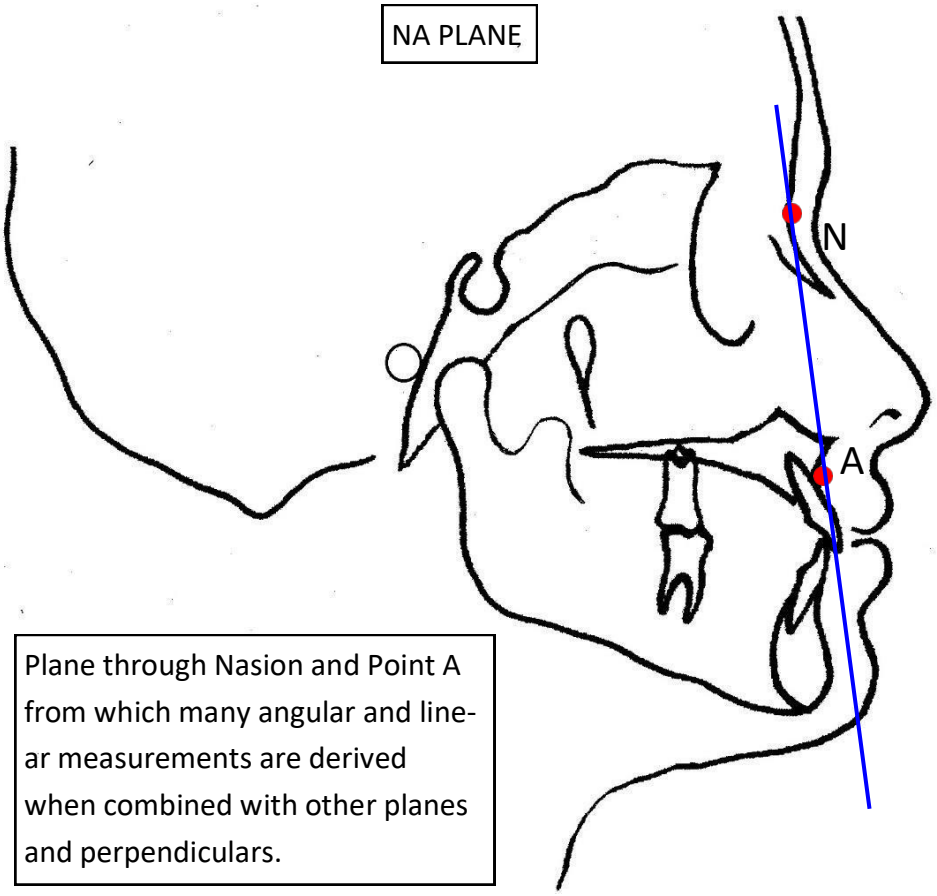
Y AXIS PLANE



Plane through Sella and Gnathion- forms Growth Indicator Angle with SN plane as well as Frankfort Horizontal.

NA PLANE



Plane through Nasion and Point A from which many angular and linear measurements are derived when combined with other planes and perpendiculars.

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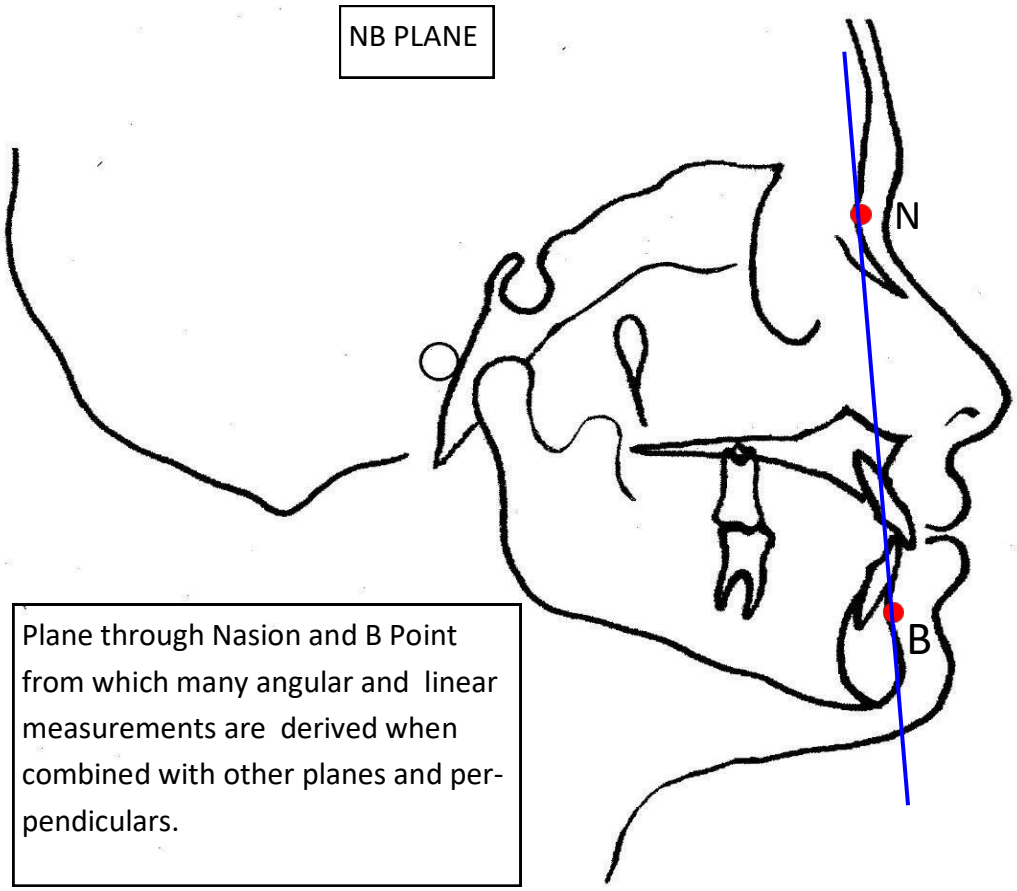

Plane through Nasion and B Point from which many angular and linear measurements are derived when combined with other planes and perpendiculars.

The Measurements:

- Extract 5 simple angles
- Make 3 linear measurements

Williams Intro Analysis

Measurement	Norm	Deviation
SNA (º)	82.0	4.0
SNB (º)	80.0	4.0

(The Difference between the two angles provides the first measurement)

The Six Measurements

ANB (º)	2.0	2.0
SN - GoGn (º)	32.0	5.0
Y-Axis (SGn-SN) (º)	67.0	3.0
Wits Appraisal (mm)	-1.0	1.0
Upper Lip – E Plane (mm)	1.0	1.0
Lower Lip – E Plane (mm)	1.0	1.0

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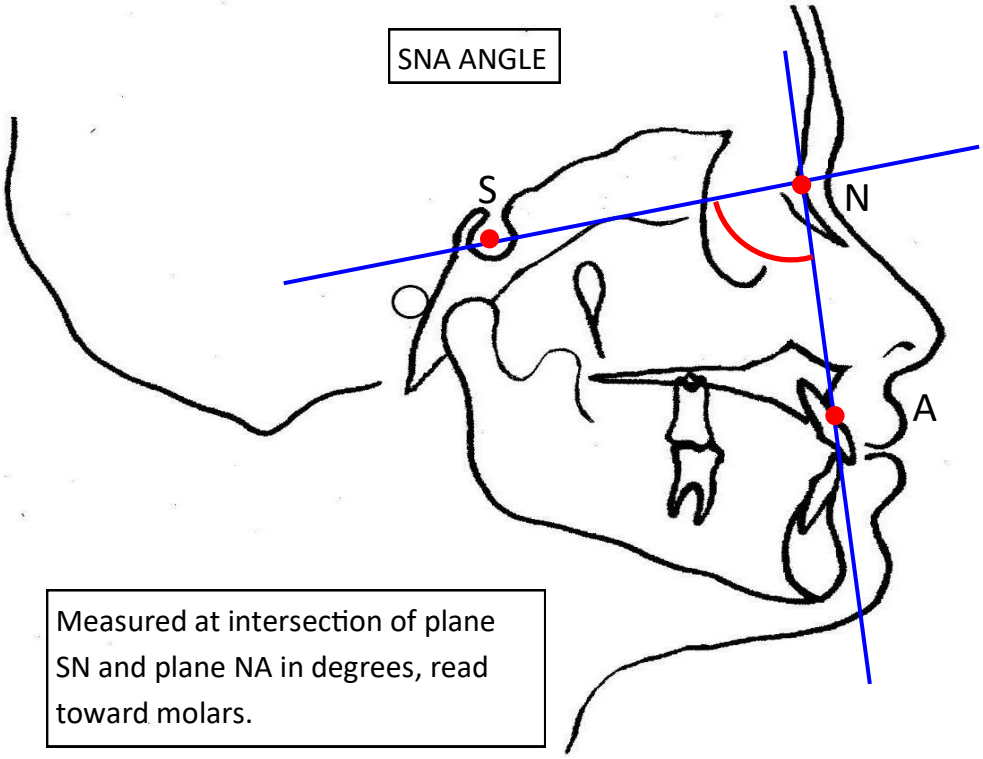
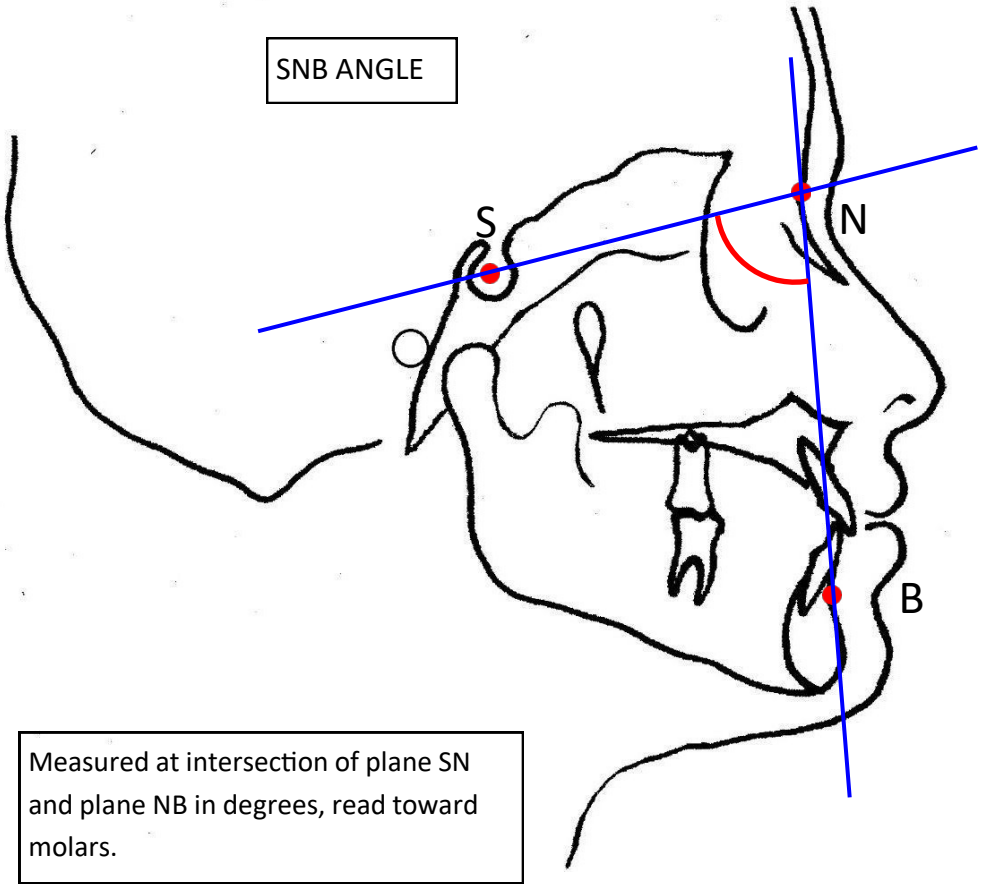
THE DIFFERENCE BETWEEN THE TWO ANGLES PROVIDES THE FIRST MEASUREMENT.

SNA ANGLE



Measured at intersection of plane SN and plane NA in degrees, read toward molars.

SNB ANGLE



Measured at intersection of plane SN and plane NB in degrees, read toward molars.

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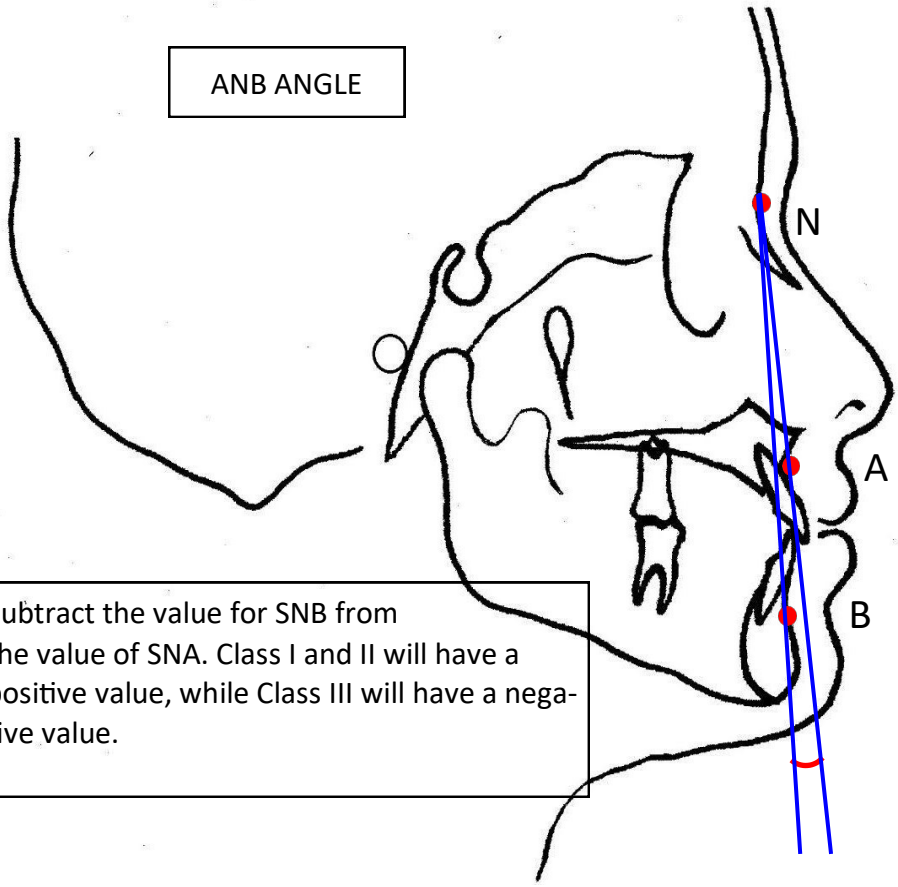
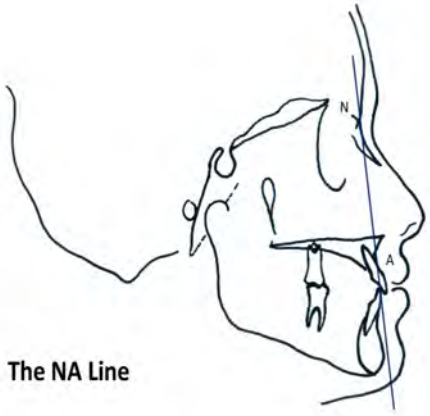
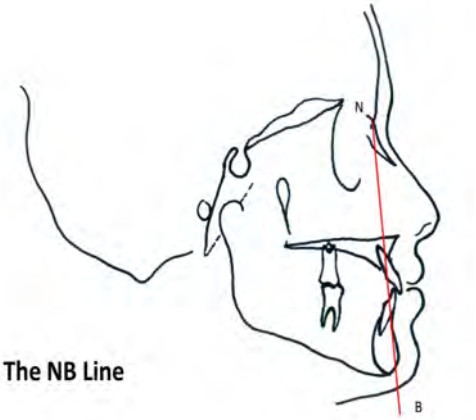
ANB ANGLE



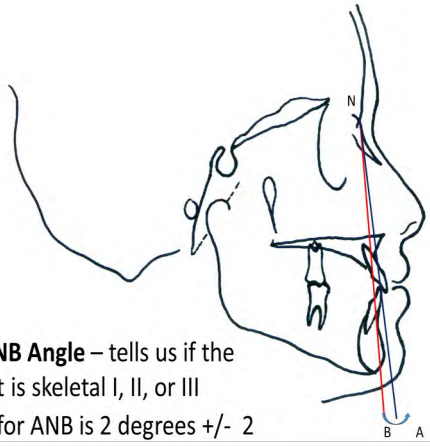
Subtract the value for SNB from the value of SNA. Class I and II will have a positive value, while Class III will have a negative value.



The NA Line



The NB Line



The ANB Angle – tells us if the patient is skeletal I, II, or III
Norm for ANB is 2 degrees +/- 2

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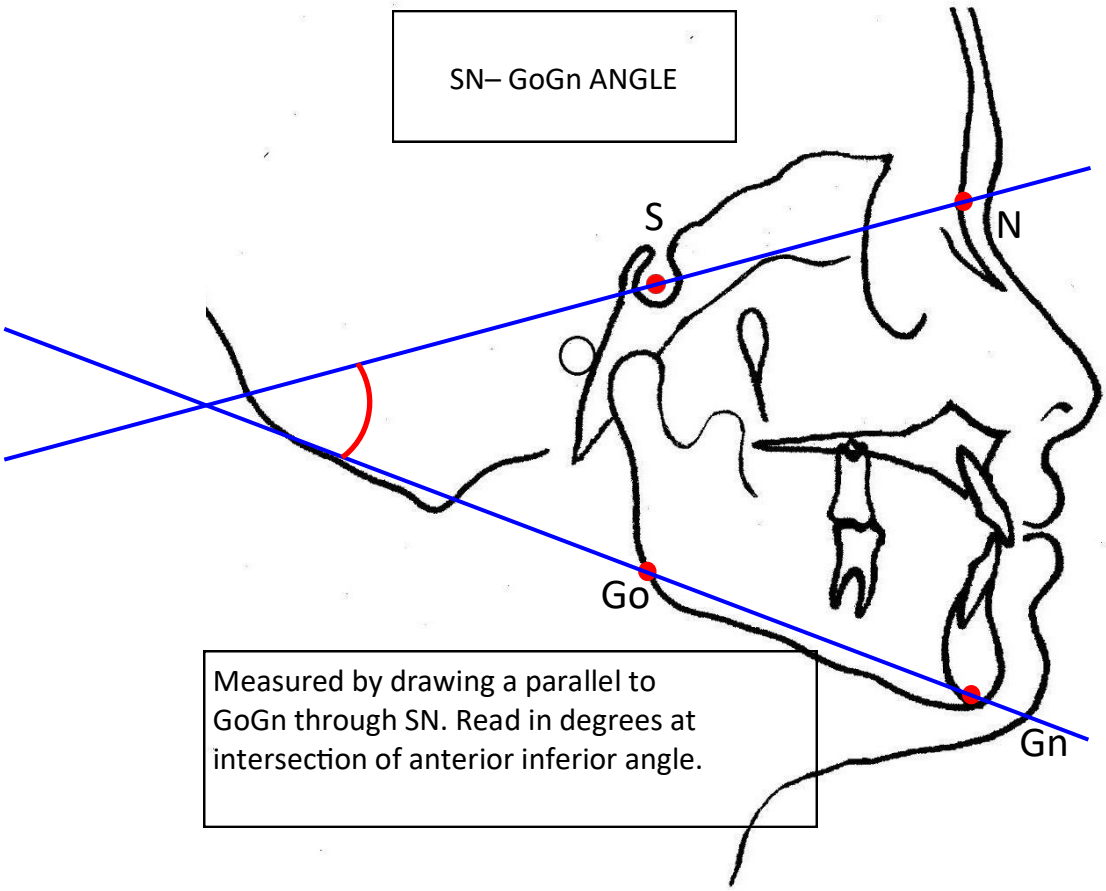
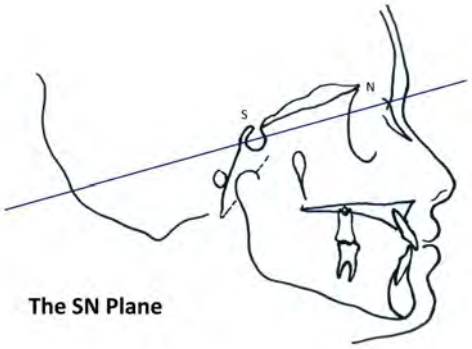
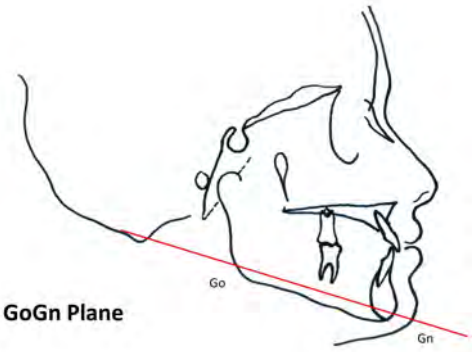
SN– GoGn ANGLE



Measured by drawing a parallel to GoGn through SN. Read in degrees at intersection of anterior inferior angle.

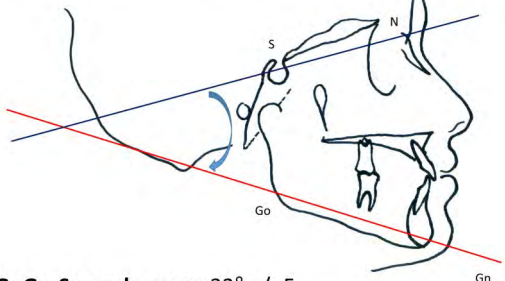


The SN Plane



The GoGn Plane

The **GoGn angle** – tells us if the patient is a long face, short face ,or neutral face.



GoGn-Sn angle norm 32° +/- 5

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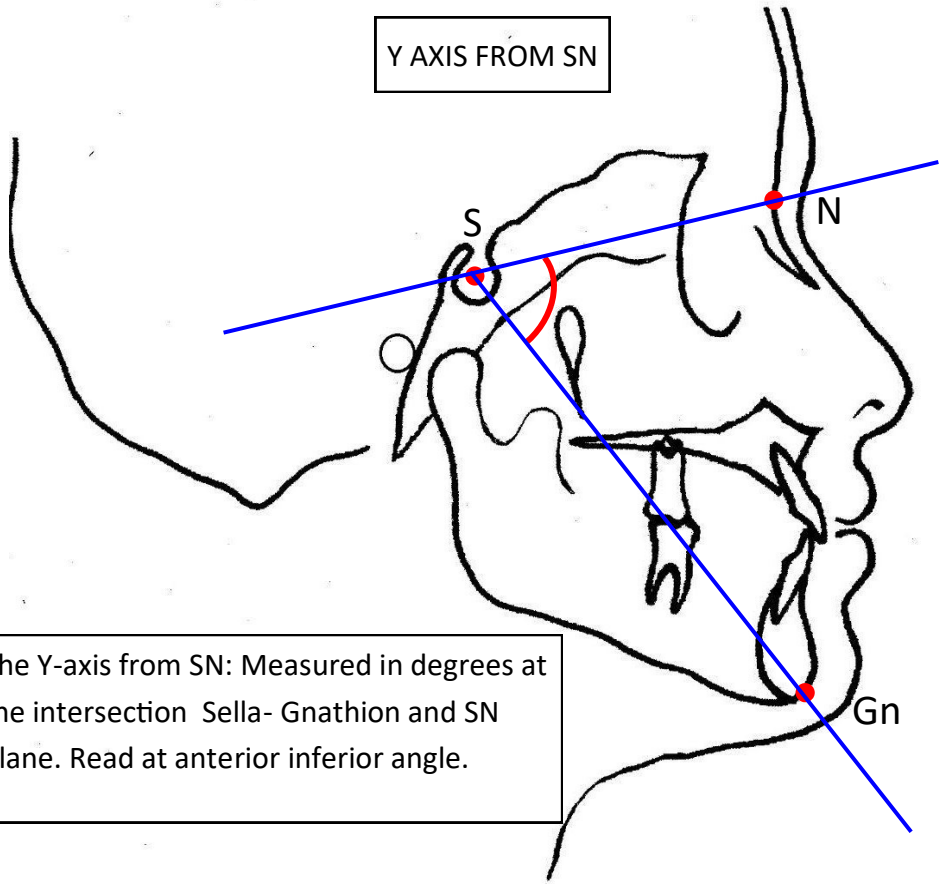
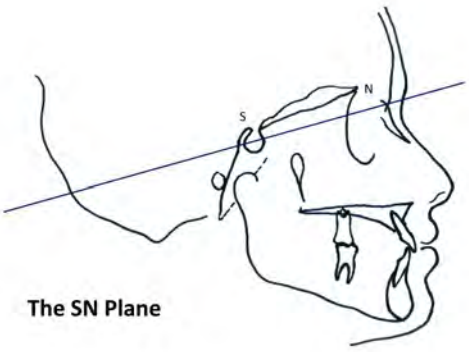
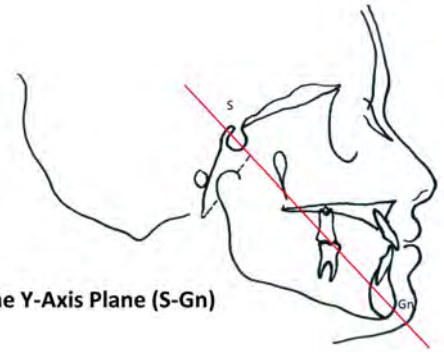


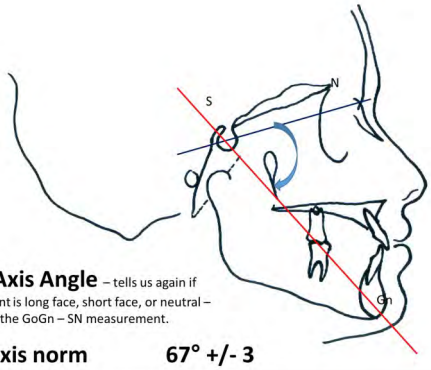
The Y-axis from SN: Measured in degrees at the intersection Sella- Gnathion and SN plane. Read at anterior inferior angle.



The SN Plane



The Y-Axis Plane (S-Gn)



The **Y-Axis Angle** – tells us again if the patient is long face, short face, or neutral – supports the GoGn – SN measurement.

Y Axis norm **67° +/- 3**

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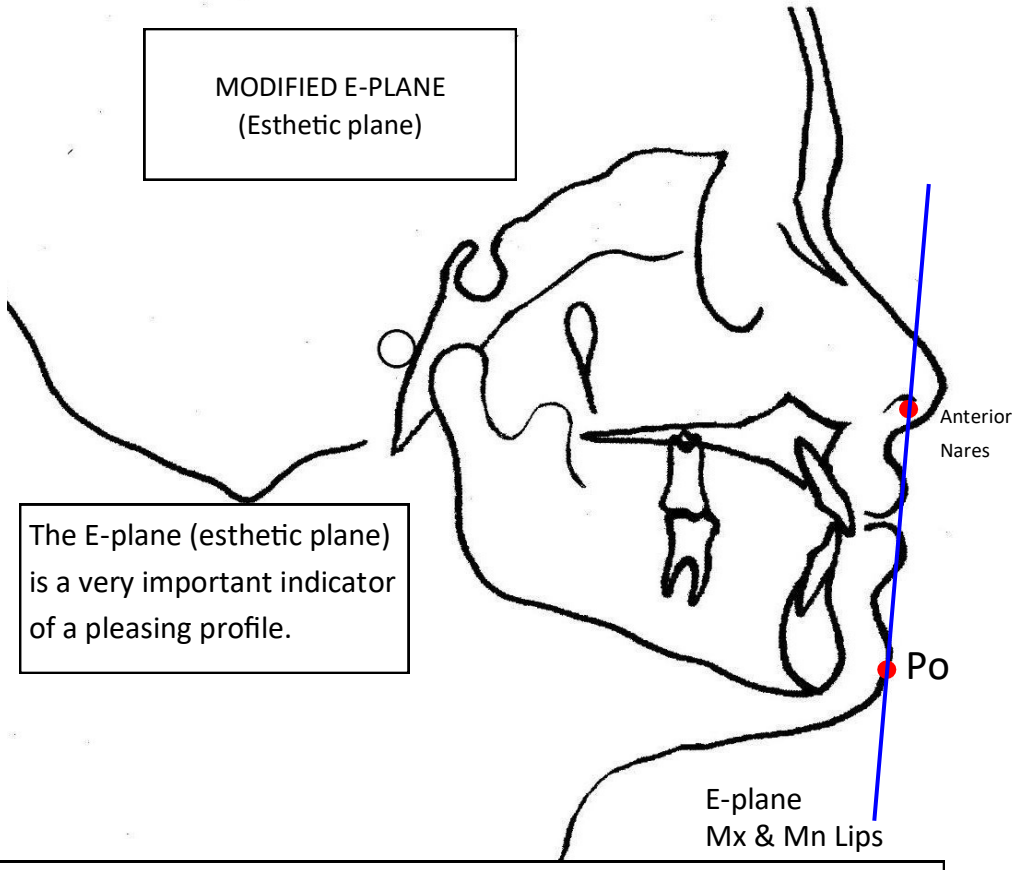
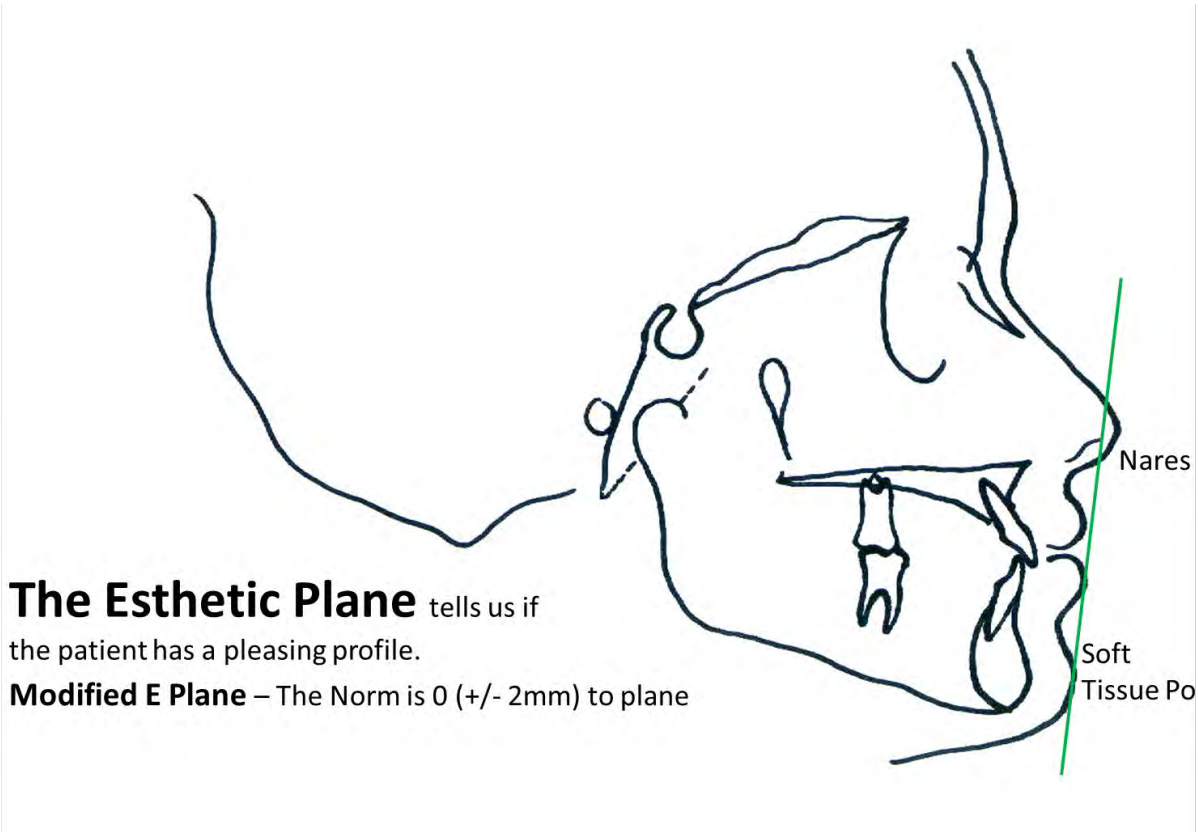
MODIFIED E-PLANE
(Esthetic plane)



The E-plane (esthetic plane) is a very important indicator of a pleasing profile.

A line is drawn from the anterior Nares to Soft Tissue Pogonion. Upper and Lower Lips are measured as positive, anterior to the line, 0 on the line and negative, posterior to the line. The normal E-plane is 0 to +2 mm to the upper and the lower lips. Balanced lips indicate a pleasing profile.



The Esthetic Plane tells us if the patient has a pleasing profile.

Modified E Plane – The Norm is 0 (+/- 2mm) to plane

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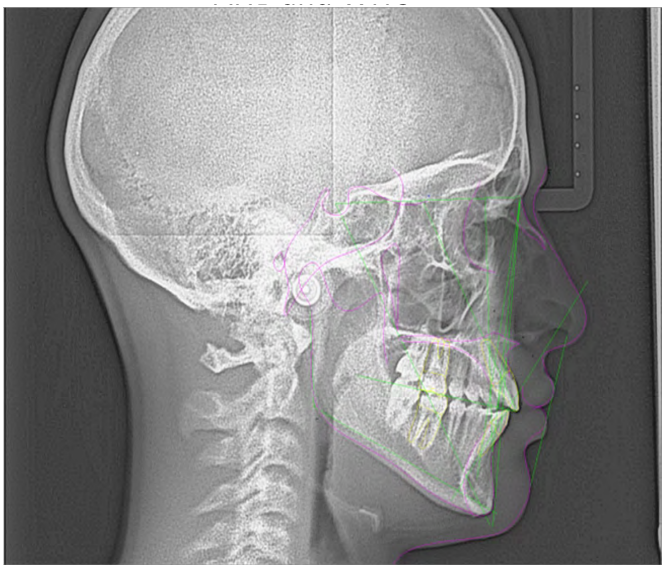
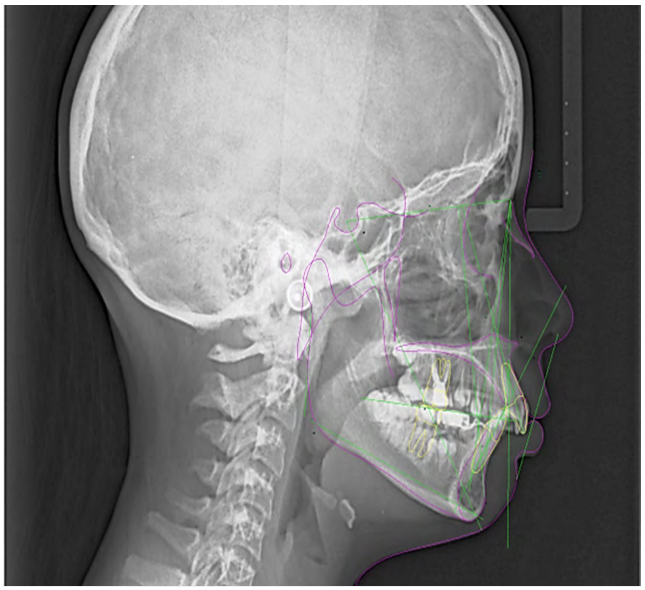
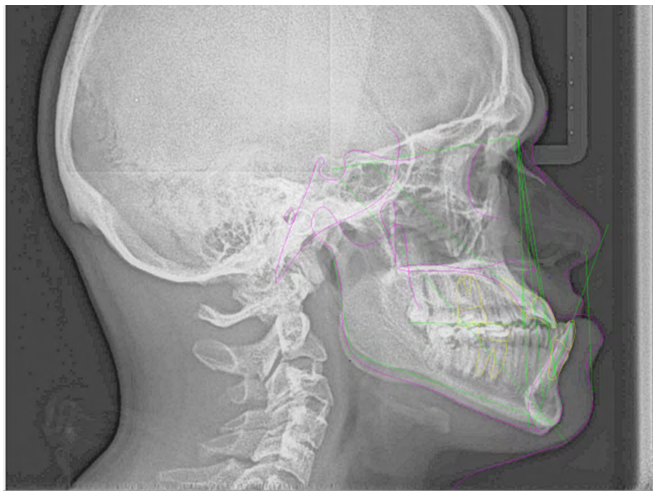
ANB and WITS



Class I Skeletal



Class II Skeletal- Overjet/Overbite



Skeletal III - Underbite

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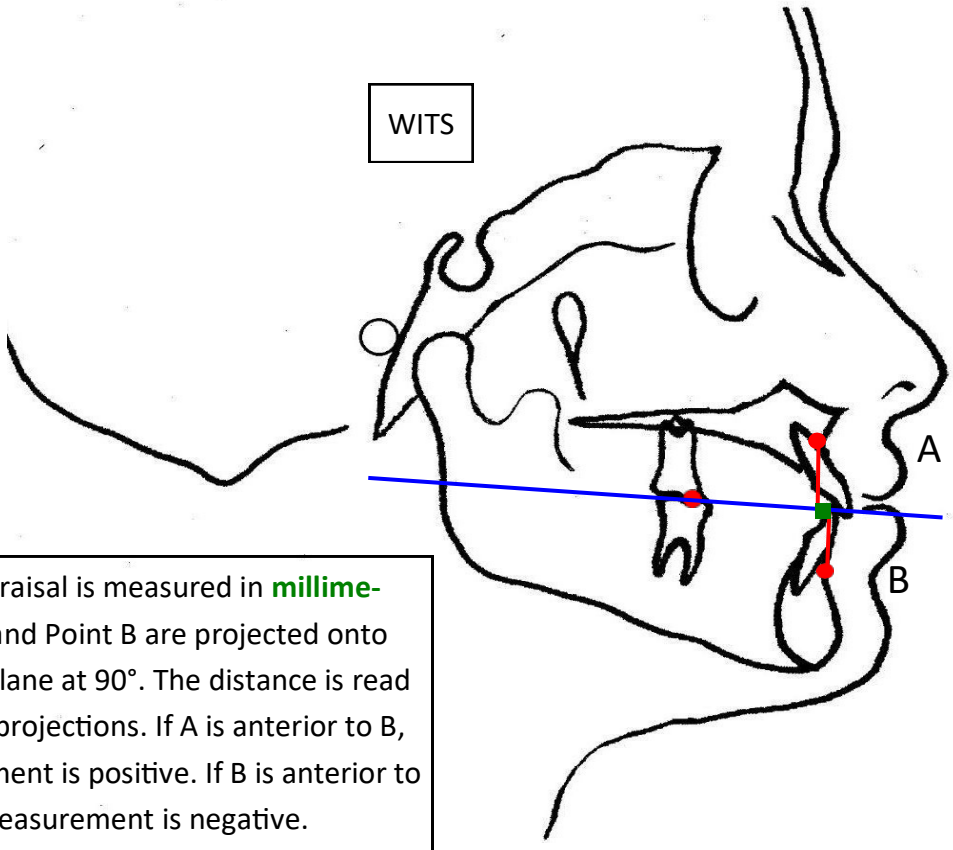
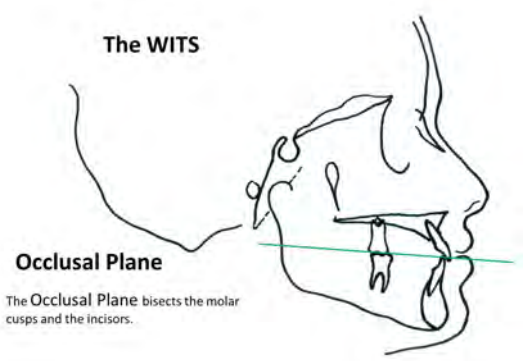
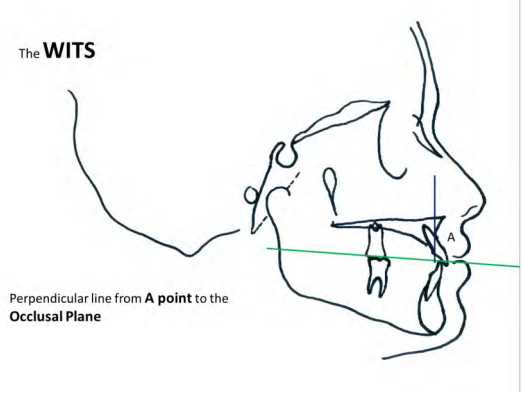
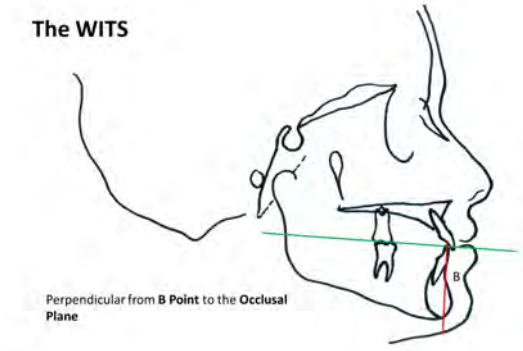
WITS

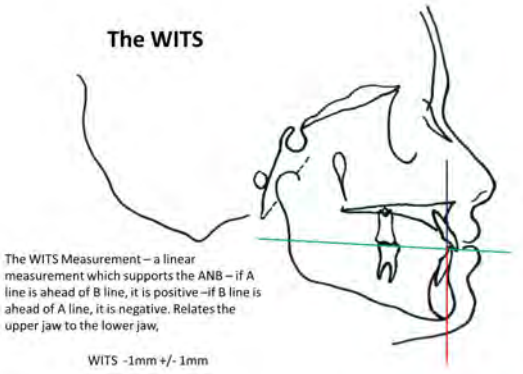


The WITS appraisal is measured in **millimeters**. Point A and Point B are projected onto the occlusal plane at 90°. The distance is read between the projections. If A is anterior to B, the measurement is positive. If B is anterior to A, then the measurement is negative.









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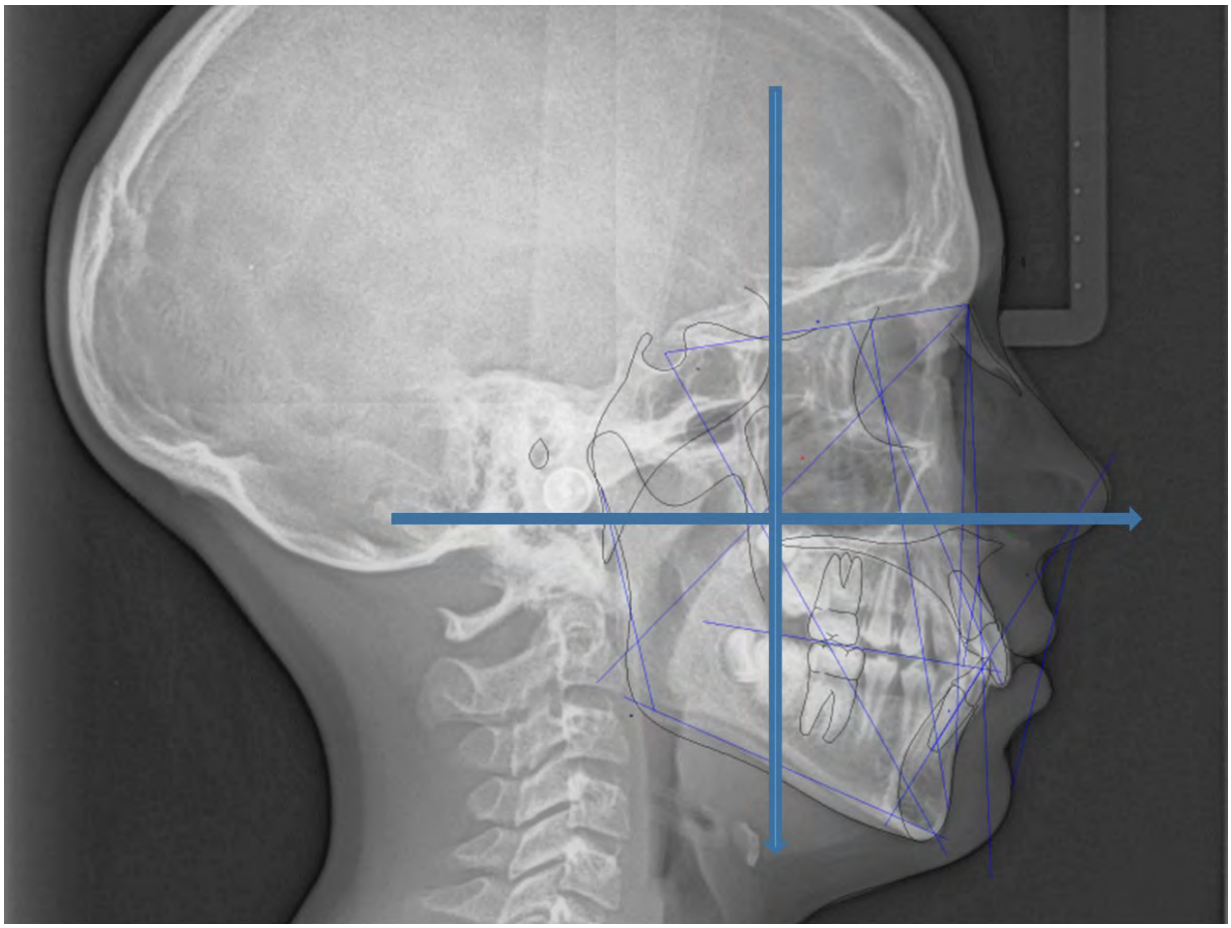
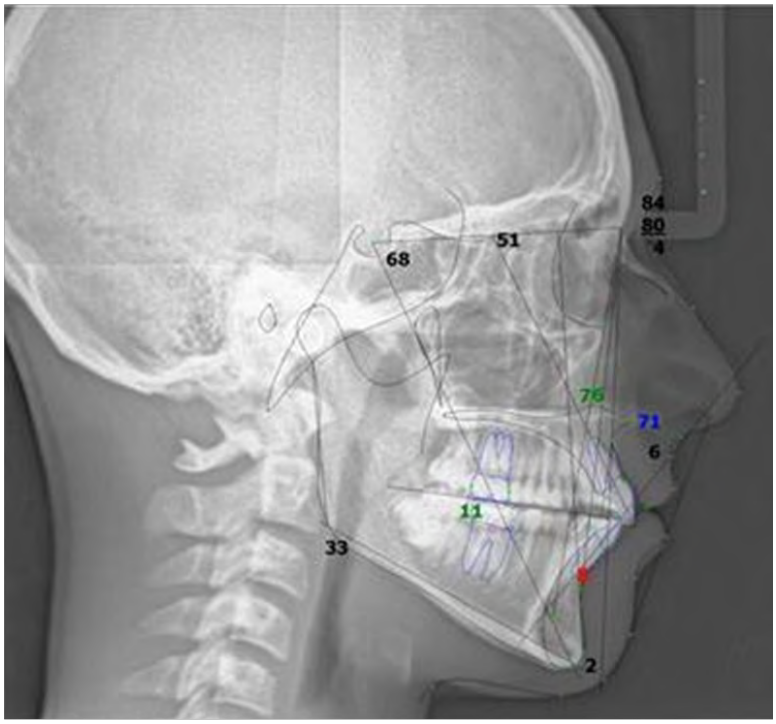


Neutral Face

Mesocephalic or Neutral Growth



GoGn = 33 degrees

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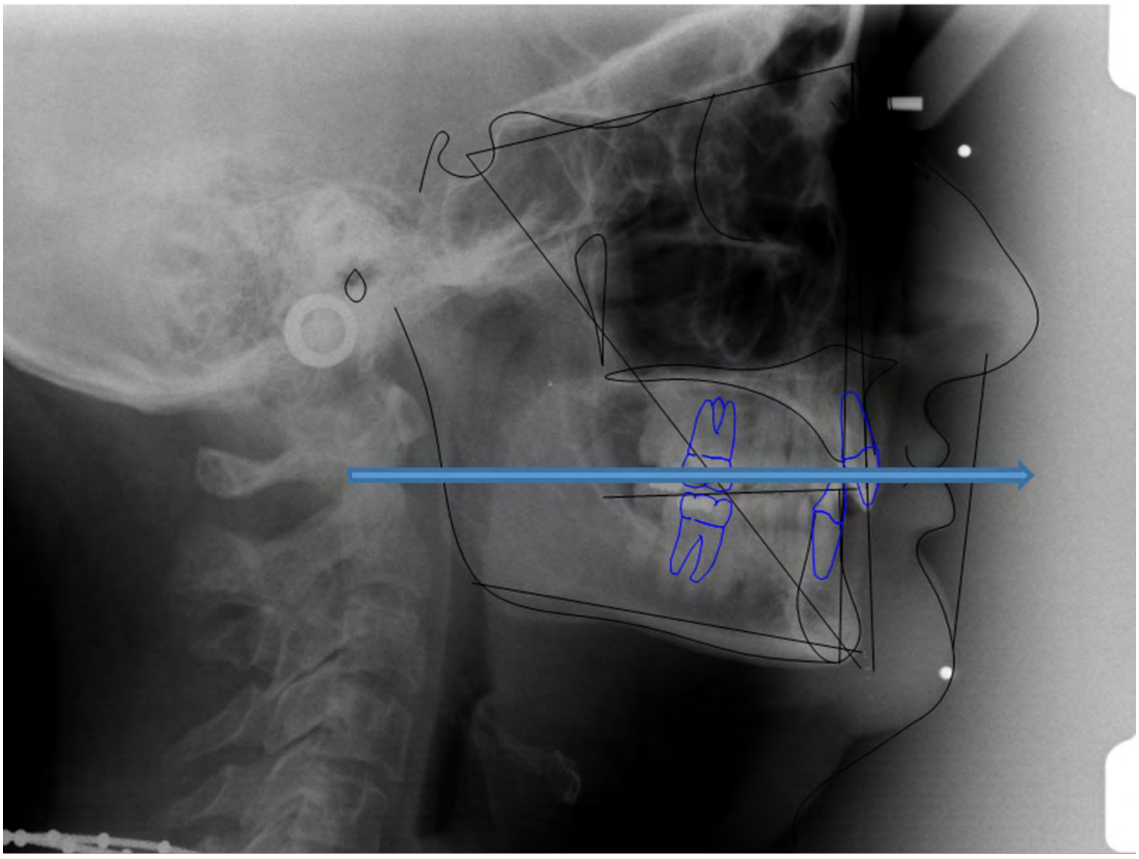
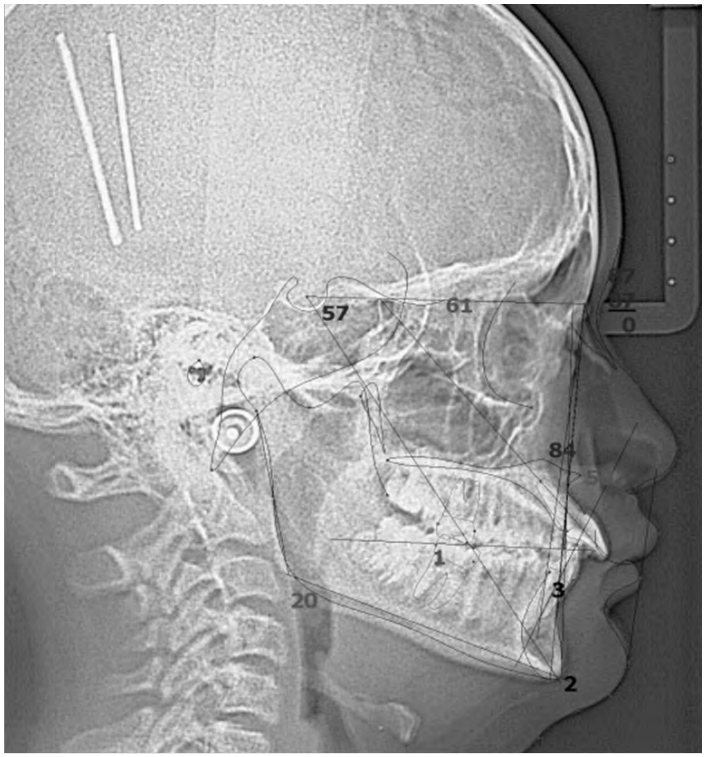


Short Face

Brachycephalic- Forward Growth



GoGn = 20 degrees

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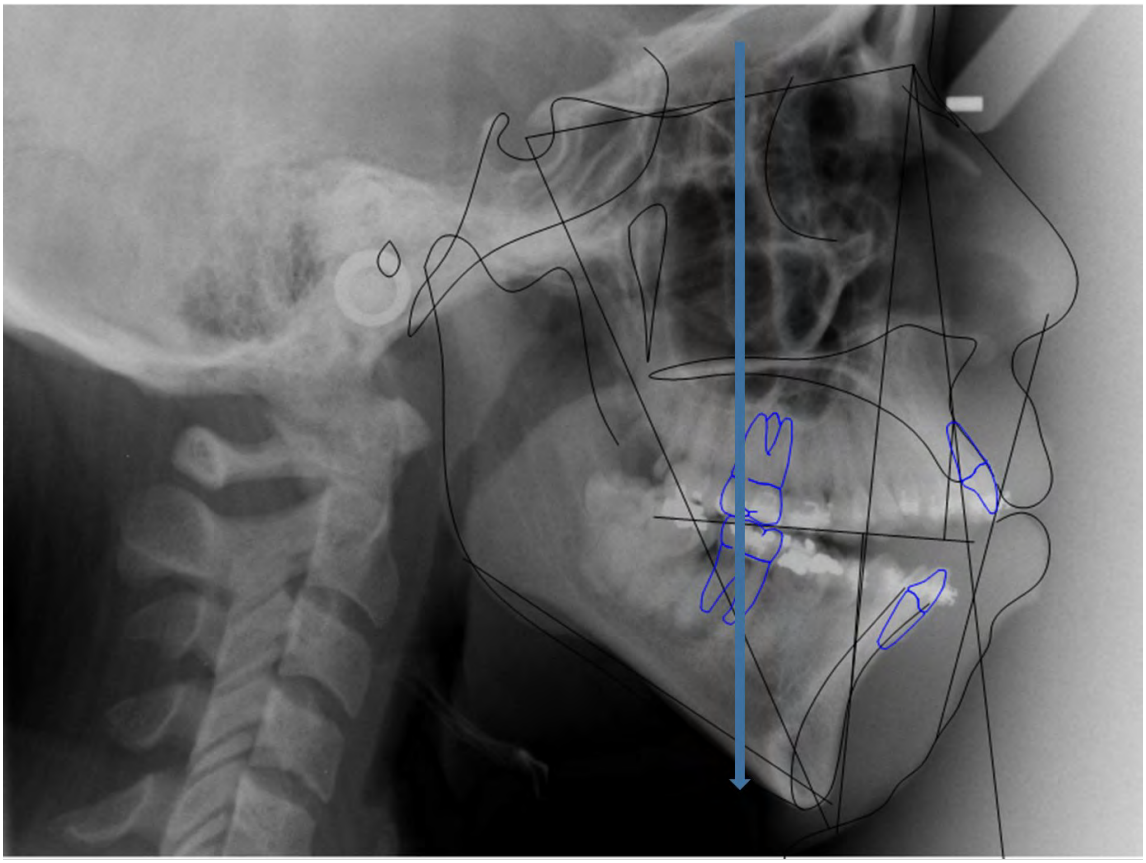
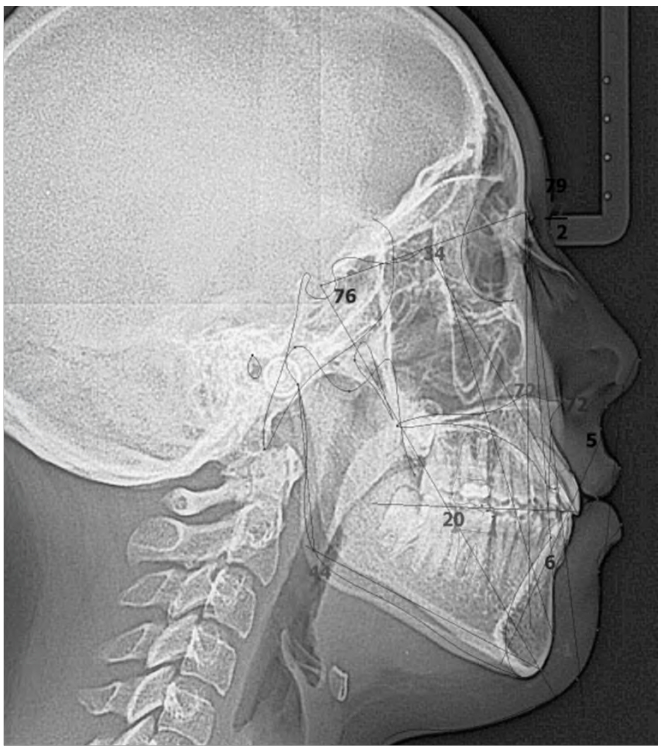


Long Face

Dolicocephalic- Downward Growth



GoGn = 44 degrees

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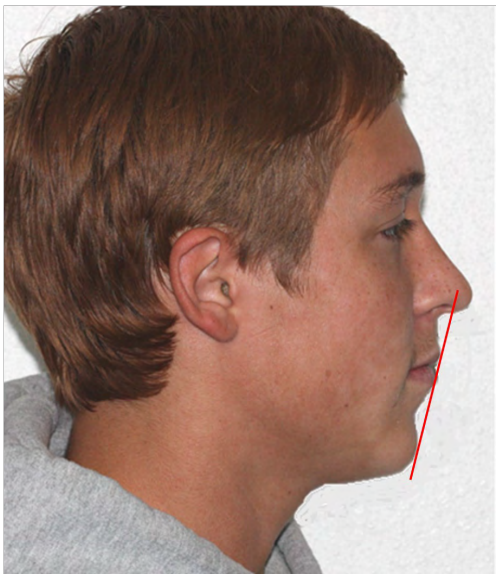
Normal E-Plane Balanced Lips



Too Full E-Plane

Negative E-Plane

Cephalometric Norms For Williams Intro Analysis

- SNA range is 82 ° + / - 4
- SNB range is 80 ° + / - 4
- ANB range is 0 to 4°
- SN-GoGn range is 32° + / - 5
- Y-axis from SN is 67° + / - 3
- WITS is –1 mm + / - 1
- E-plane to upper lip is 0 to +2 mm
- E-plane to lower lip is 0 to +2 mm

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Williams *Intro* Cephalometric Analysis

Patient:_____ **Age:**_____ **Date:**_____

Dental Classification (Class I, II, or III)

Molar Difference ____R____L 0 mm (+ = II; - = III)

Cuspid Difference ____R____L 0 mm (+ = II; - = III)

Check One: _____ I ____ II ____III

Cephalometric Analysis

Measurement	Value	Norm	Notes
SNA	_____	82° +/- 4°	_____
SNB	_____	80° +/- 4°	_____
ANB	_____	0 to 4°	_____
WITS mm	_____	–1mm +/- 1mm	_____
SN-GoGn	_____	32° +/- 5°	_____
Y axis (SN)	_____	67° +/- 3°	_____
E-plane MX lip	_____	0 to +2 mm	_____
E-plane MN lip	_____	0 to +2 mm	_____

Skeletal Classification

1 ANB ____ ° 0 - 4° > = II; < = III

2 WITS ____ mm -1 +/- 1mm > = II; < = III

Check One: ____ I ____ II ____III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

3 SN-GoGn ____ ° 32 ° +/- 5 ° > =Clock; < = Counter

4 Y Axis (SN) ____ ° 67 ° +/- 3 ° > = Clock; < = Counter

Balanced Face – Esthetic Profile

5 E Plane Mx Lip ___ mm 0 mm +/- 2 mm < = Concave; > = Convex

6 E Plane Mn Lip ___ mm 0 mm +/- 2 mm < = Concave; > = Convex

SUMMARY:

_____

_____

This form organizes the six simple cephalometric measurements used in the Williams Intro Analysis

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DEFINITIONS OF CEPHALOMETRIC LANDMARKS

(courtesy of AAO website)

Anterior Nasal Spine (ANS) The Median, sharp, bony process of the maxilla at the lower margin of the anterior nasal opening. It is considered by many as a separation of the upper face from the lower face.

Esthetic Plane (E plane) A plane extending from a point on the nose to the forward point of the soft tissue chin (soft tissue Pogonion). The outer margins of the lips are measured to this plane, to indicate too much lip support, too little lip support, or norm positions of the lips. A more accurate method of establishing the position of the E-plane is to find Steiner's "S" point, which is approximately equal to the anterior border of the nares (nasal opening). The lips are considered to be in norm relation when they touch or are parallel to the E- plane.

Facial Height The distance in millimeters from the Nasion to anterior nasal spine to pogonion on a lateral head film. In general, the ratio of the upper face height to the lower face height (UF/LF) is 50%/50% in young girls and boys. Later in young adulthood, males increase their lower face height so the ratio is closer to 45%/55%.

Gnathion (GN) The lowest point of the median plane in the lower border of the chin. It is a point on bony border palpated from below and naturally lies posterior to the tegumental border of the chin. In cephalometrics it is the midpoint between the most anterior and the most inferior points of the bony chin.

Gonion (Go) The lowest, posterior-most, and most outward point of the angle of the mandible. It is obtained by bisecting the angle formed by tangents of the lower and the posterior borders of the mandible. When both angles appear on the profile roentgenogram, the point midway between the right and left side is used.

Menton (M) The lowest point from which face heights are measured. It is the most inferior point of the bony chin, and lies posterior and inferior to Gnathion.

Nasion (N) The middle point of the fronto-nasal suture. The point at the root of the nose intersected by the median sagittal plane. The root of the nose corresponds to the fronto-nasal suture, but it is not always the lowest point of the forsum of the nose.

Nasion to Point A (NA) A cephalometric plane used to determine the relative prognathism of the maxillary denture base; also to which is compared the axis of the maxillary central incisor.

Nasion to Point B(NB) A cephalometric plane used to determine the relative prognathism of the mandibular denture base. Also to which is compared the axis of the mandibular central incisor.

Nasion to Point D (ND) A cephalometric plane used to determine the relative prognathism of the mandible without regard to the chin- button.

Occlusal Plane (Occl Pl) The occlusal plane of the teeth. A line drawn between points representing one half of the incisor overbite and one half of the cusp height of the last occluding molar.

Orbitale (O) The lowest point on the margin of the orbit. Since this point varies from person to person, even in the same subject, the orbital point in orthodontic measurement is usually accepted as the point on the lower margin of the orbit directly below the pupil when the eye is open and the patient is looking straight ahead.

Pogonion (P) The most anterior, prominent point of the chin.

Point A (A) A measuring point taken at the innermost curvature from the maxillary anterior nasal spine to the crest of the maxillary alveolar process; the most depressed area of bone between the anterior nasal spine and the labial crest of the alveolus at the most labially inclined maxillary central incisor.

Sella-Gnathion plane (Same as Y-axis of growth) Used to orient the balance vertical and horizontal growth seen in an individual. A measurement if 65 degrees +/- 5 indicates a neutral growth pattern. A greater measurement indicates a clockwise growth pattern and a lesser measurement indicates a counter-clockwise growth pattern. (Y-axis is also measured as it passes through the Frankfort horizontal. A neutral growth pattern is indicated by 59 degrees +/-5.)

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Point B (B) A measuring point on the anterior profile curvature from the mandibular anthropometric landmark, pogonion, to the crest of the alveolar process; the most depressed area of bone between pogonion and the labial crest of bone at the most labially inclined mandibular central incisor.

Point D (D) A measuring point located in the center of the mandibular symphysis in an antero-posterior relationship.

Porion (P) The midpoint on the upper edge of the external auditory meatus. As a cephalometric landmark, it is located by means of the metal rods of the cephalometer, or by a point directly ten millimeters distal to the most superior point on the head of the bony condyle.

Posterior Nasal Spine (PNS) Process formed by uniting projected ends of the posterior borders of the palatine process of the palatal bones.

Pterygomaxillary (Ptm) The point where the pterygoid process of the sphenoid bone and the pterygoid process of the maxilla form the pterygomaxillary fissure; the anterior border of the greater wing of the sphenoid bone and the posterior border of the maxilla. The lowest point of the opening is used in cephalometrics. (Theoretically, a point located on the posterior-superior aspect of thepterygomaxillary fissure is the point of center of growth of the face and skull. This is termed Ricketts point (Pt).

Sella-Nasion Plane (SN) A plane used in cephalometrics to describe mid-sagittal anterior cranial base, to, which is, related the most anterior borders of the maxillary and mandibular alveolar bases (SNA and SNB).

Sella-Nasion A Point (SNA or Subspinale) Antero- posterior relationship of the maxillary basal arch to the anterior cranial base. This shows the degree of maxillaryprognathism

Sella-Nasion B Point (SNB or Supramentale) Shows the anterior limit of the mandibular basal arch in relation to the anterior cranial base.

Sella Tursica A cephalometric point, commonly called Sella, is located in the middle of the outline of the hypophyseal fossa as seen in the lateral head film; the geometric center of the pituitary fossa of the sphenoid bone; serves as a posterior landmark for Sella-Nasion plane.

SL Measurement SL measurement is a growth indicator and is located by drawing a line perpendicular to Sella Nasion line through pogonion. The length is measured on the SN line in millimeters from Sella point to the intersection of the pogonion perpendicular line. Neutral growth will be 51 mm +/- 5. Less indicated a vertical growth pattern and more indicates a horizontal growth pattern.

SNA-SNB (ANB) The angle formed by Sella-NasionA point (subspinale) and Sella-Nasion B point (supramentale). It indicates antero-posterior relationship of maxillary and mandibular basal arches to the anterior cranial base.

WITS Analysis Conceived primarily as a way to overcome the limitations of ANB as an indicator of jaw discrepancy. It is based on projections of points A and B to the occlusal plane, along which the linear difference between these points is measured. (WITS appraisal was named by Dr. Alex Jacobsen after his alma mater, Witwatersrand University, South Africa, where he popularized it, in assessing anterior-posterior jaw comparisons.

Y-Axis A line connecting the geometric center of theSella Tursica with the Gnathion. This is the vector of downward and forward growth of the face beneath the cranium. There are two Y-axis angles in Cephalometrics; one formed by the intersection of the S-N and Y- axis, and the other that is formed by the intersection of F-H and Y-axis. It is the latter that is most commonly used in cephalometric analysis.

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Williams Intro Diagnosis & Basic Diagnosis

Basic Course

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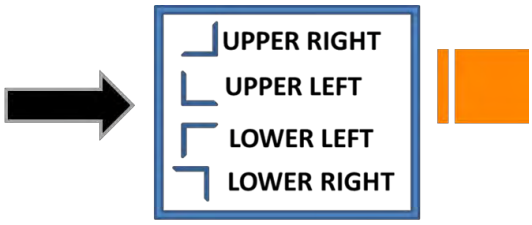
Introduction to Diagnosis

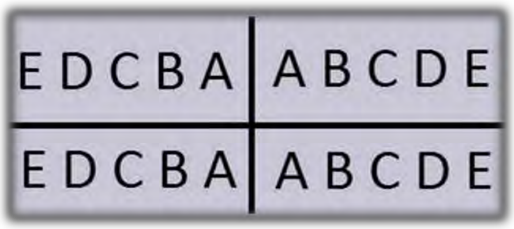
The Palmer Notation System

- Orthodontists preferred language. “ortho speak”.
- You probably have never been exposed to this numbering system.
- But, if your doctor ever says, “we need to preserve the “E space”.

  or let’s place a “3 x 3” lower retainer, he is speaking “Palmer”.

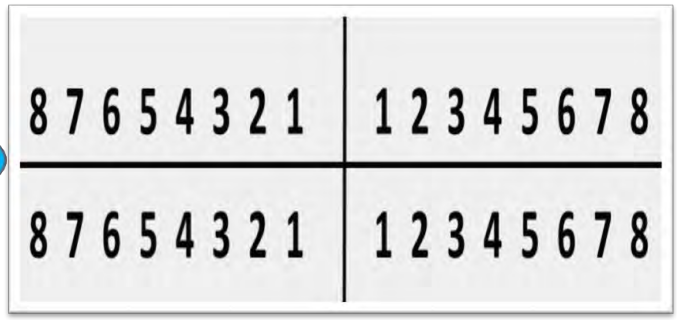
- The Palmer notation consists of a symbol (┘ └ ┐ ┌) designating in which quadrant the tooth is found and a number indicating the position from the midline.





PRIMARY

PERMANENT



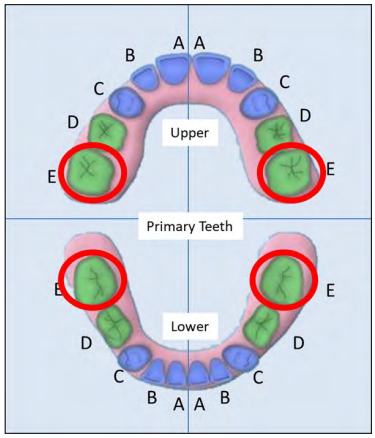
PALMER SYSTEM FOR DECIDUOUS TEETH

E – Maxillary right 2nd molar- URE

E – Maxillary left 2nd molar-ULE

E – Mandibular left 2nd molar-LLE

E – Mandibular right 2nd molar-LRE



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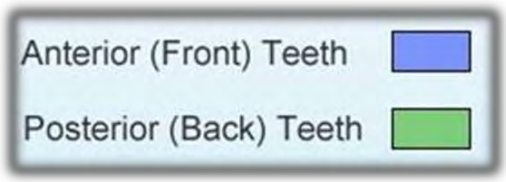
PALMER SYSTEM FOR PERMENANT TEETH

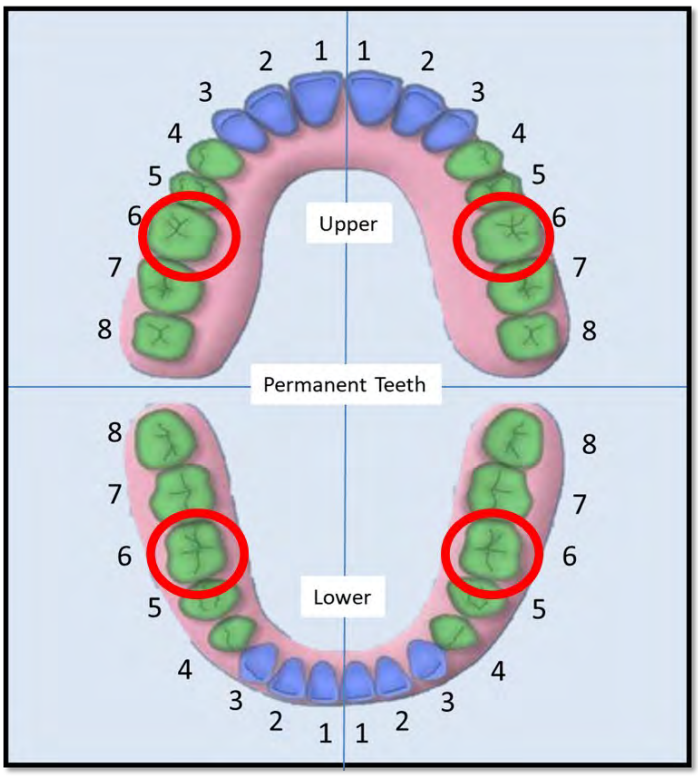
6 – Maxillary right 1ST molar- UR6

6 – Maxillary left 1ST molar- UL6

6 – Mandibular left 1ST molar- LL6

6 – Mandibular right 1ST molar- LR6





It is really impossible to actually chart the Palmer system in clinical notes because it has quadrant symbols as it's primary feature.

So, the only practical way to express the Palmer system in digital charts today is to write the description of the quadrant, UR, LL, etc., followed by the permanent number 1-8 or primary letter A-E.

Examples:

- #3 is written in Palmer as UR6.
- A 3 x 3 retainer is actually Palmer LL3 to LR3 which in Universal is #22 to #27
- When your doctor refers to the 6's he/she is talking about the 1st molars.
- When he talks about the E space he is talking about the primary 2nd molars and the space they hold for the permanent 2nd premolars which would be the 5's in Palmer.

Calendar and dental age determines what dentition we are diagnosing.

Stages of Dental Development

- Primary Dentition
- Transitional or Mixed Dentition
- Adolescent Dentition
- Adult Dentition

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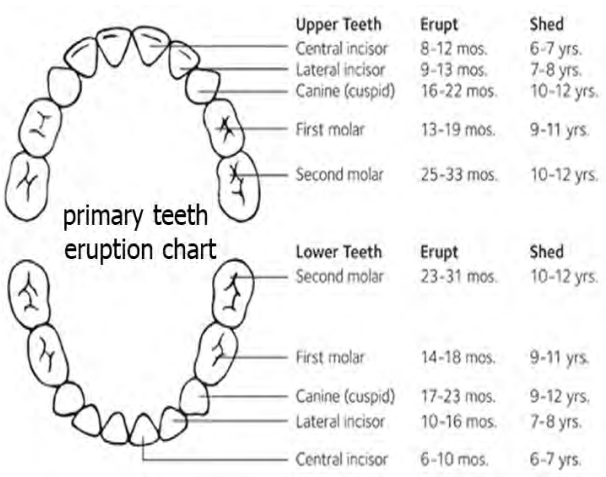

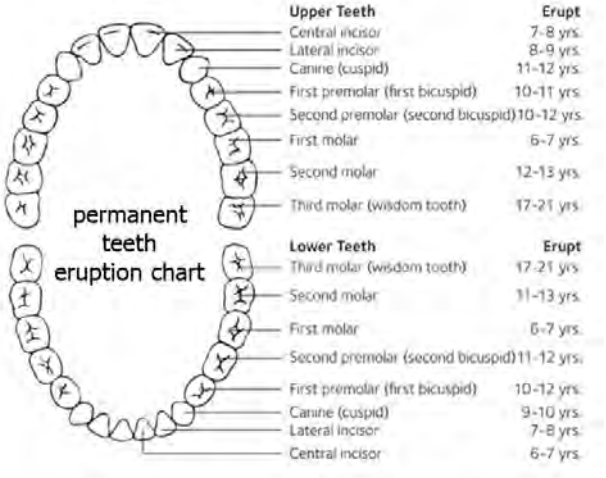

Here are the eruption charts for all the primary and permanent teeth. Again, the age helps define what dentition we are currently treating.

Primary Dentition– Age 3 (usually, orthodontic treatment will begin no earlier than age 4).

The Primary Dentition is made up of teeth that have developed and erupted first. There are a total of 20 primary (baby) teeth. Orthodontic treatment is rarely involves the primary dentition.

Transitional or Mixed Dentition– begins at age 6 (orthodontic treatment at this stage is usually started no earlier than 7). The Transitional or Mixed is when there is a combination of primary teeth and permanent teeth.

Adolescent Dentition– Begins at Age 12 and can continue thru age 14 in girls and as late as 18 in boys. The Adolescent Dentition is the dentition that is present after the normal loss of all primary teeth and prior to the cessation of growth.

Adult Dentition– Begins at Age 18 The Adult Dentition is the dentition that is present after the cessation of growth.

The orthodontic problem is defined using the information obtained during the consultation evaluation and the workup. You, the dentist, will look at the patient's teeth in 3 planes of space.

- Up/Down
- Side to Side
- Front to Back

Dental age also will help determine the diagnosis.

UP/DOWN (Vertical)

- Overbite
- Open Bite

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Overbite

- Prefer to express in %
- "Your daughter has 100% overbite. That means her upper teeth cover 100% of her lower teeth when she bites together. We would like to see 80% of the lower teeth when she bites together. We only see 1% and she is biting the roof of her mouth."

Open Bites

- Usually associated with a thumb or finger sucking habit or a tongue thrust.
- These are difficult to treat and may require separate appliances.

SIDE-TO-SIDE (transverse or horizontal)

- Crossbites in the back (posterior)
  - Unilateral or bilateral
  - Scissor (reverse)
- Arch Constriction
  - Upper
  - Lower

Bilateral Posterior Crossbite

Unilateral Posterior Crossbite

Scissor (reverse) Posterior Crossbite—Bilateral (both sides)

All the lower premolars are sitting all the way inside the upper premolars.

Scissor bite (reverse posterior crossbite)

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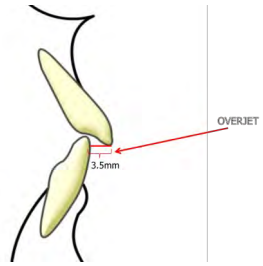
Before-
40-year old Adult Male

After-
NPE, Big Daddy & SWS

Arch Constriction

FRONT TO BACK (sagittal)

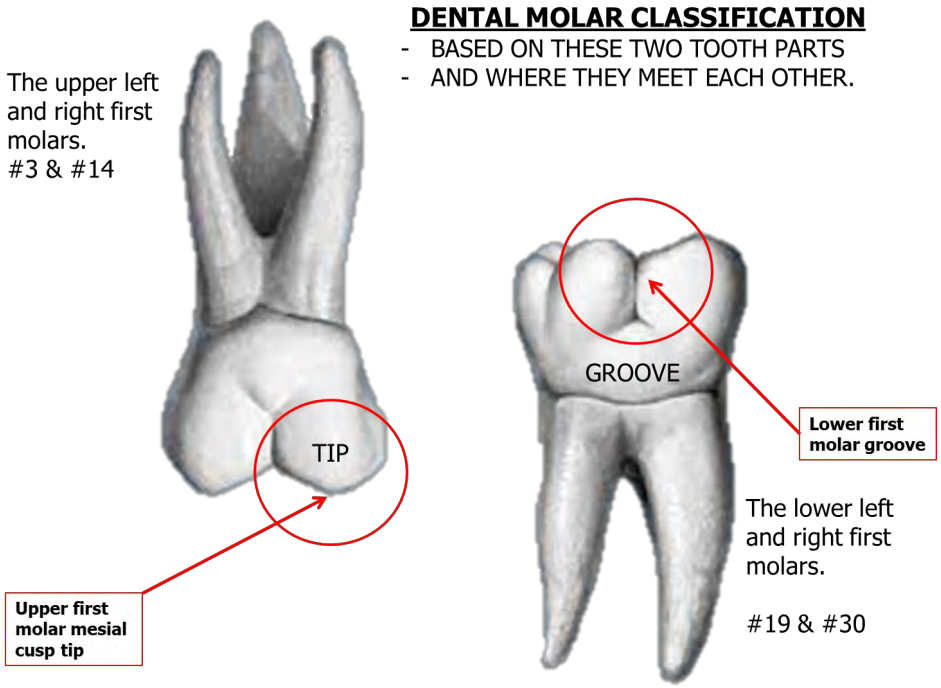


- Overjet
- Molar classification

Incisal Overjet- (The amount the upper front tooth sticks out past the lower front tooth).

- Incisal Overjet is measured in millimeters from the facial surface of the tip of lower incisor to the facial surface of the tip of upper incisor. If U1 is anterior to L1 then the measurement is positive. If L1 is anterior to U1 then the measurement is negative.

DENTAL MOLAR CLASSIFICATION



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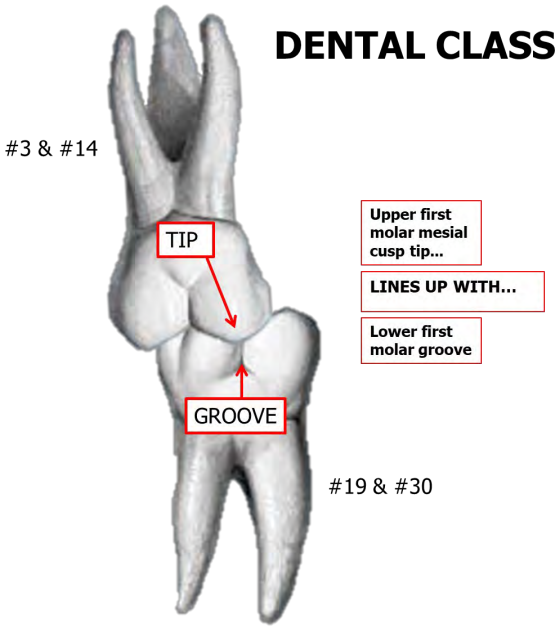
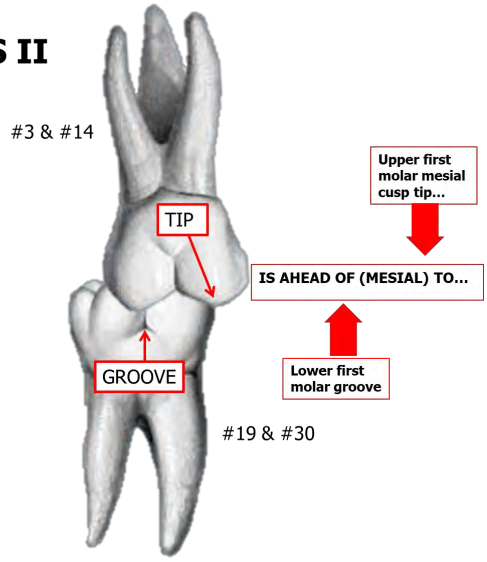
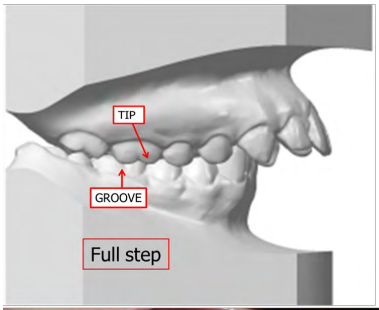
DENTAL CLASS I



Class I – the upper first molar mesial cusp tip lines up with the lower first molar groove.

DENTAL CLASS II





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One More Important Bit Of Information On Dental Class II Malocclusions.

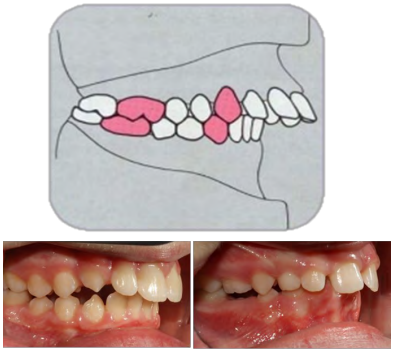
There Are 2 General Categories Into Which Class II Cases Are Usually Divided.

These two are:

Class II Division 1 & Class II Division 2

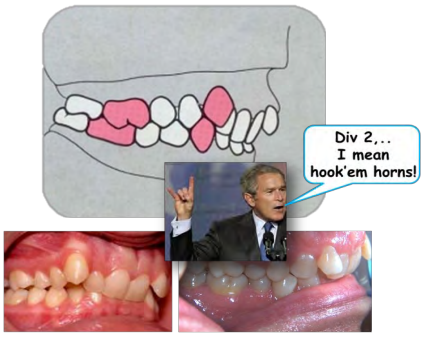
- You will hear doctors refer to these as "Class II div 1 or 2" or a "Div 1" or "Div 2" case.
- All we are talking about are cases where the U6 is ahead of the L6, full or half-step but in addition to the molars we always look at, we are also looking at the incisors and whether they are sticking out, protrusive or are they are pushed in, retrusive.
- No big deal. Dental Class II's with Bucky incisor; Div 1 or Hook'em Horns incisors; Div 2.

Class II Division 1



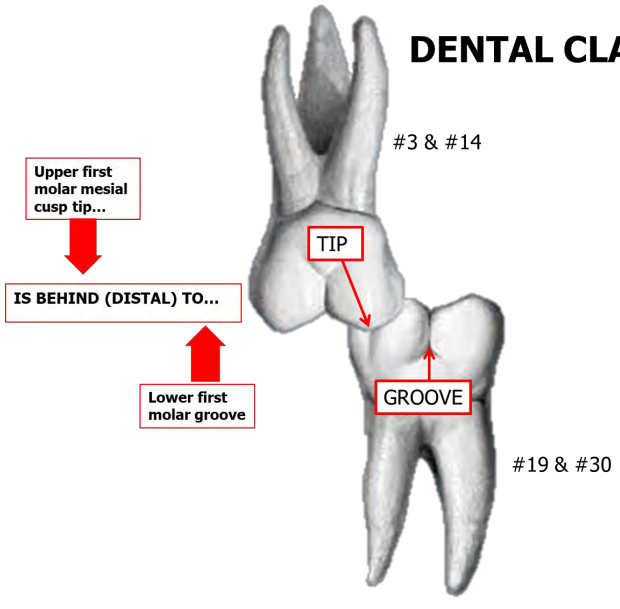
The **Division 1** cases are the class II cases in which the incisors are protrusive or "bucky" That means the upper incisors are sticking out, protrusive, proclined.

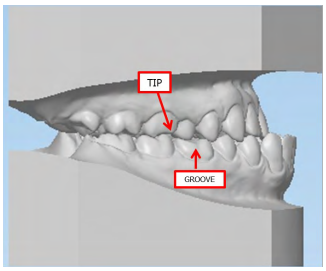
Class II Division 2



The **Division 2** cases are the class II cases in which the incisors are intrusive or "hook'em horns" That means the upper incisors are pushed back, intruded or retroclined while the adjacent teeth are alittle protruded.

DENTAL CLASS III





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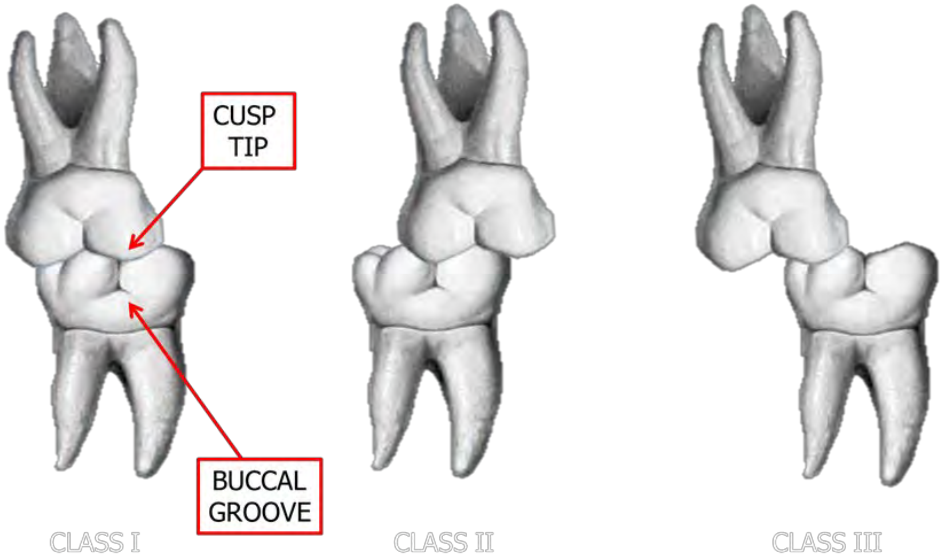
Molar Classification in Summary

- If the molar Class II or III appears only on one side and the other side is normal, the dentition is referred to by the malocclusion but is given a subdivision left or right depending on which side the malocclusion is on.
- So, if a dentition has Class I molars on the right and Class II molars on the left, then the classification is Class II subdivision left.
- Subdivision specification is not used as much as it used to.



The Dental Classification

- In most general practices, the dental molar classification is used to identify the orthodontic treatment plan.
- Since dental Class I takes the least amount of time, dental Class II takes longer and dental Class III the longest, cost is set based on these differences.

Model Analysis, Cephalometric Interpretation and Orthodontic Diagnosis

The Records we gather are used to make the orthodontic diagnosis:

- Clinial exam
- Photos
- Models and analysis
- Ceph and analysis

Based on this diagnosis, as GP's and Ped's we decide to refer the case to the orthodontist or to treat the case ourselves.

We use the photos and the models to obtain:

- Dental Classification
- Molar Relationship
- Other vital information for our data base used to make the diagnosis

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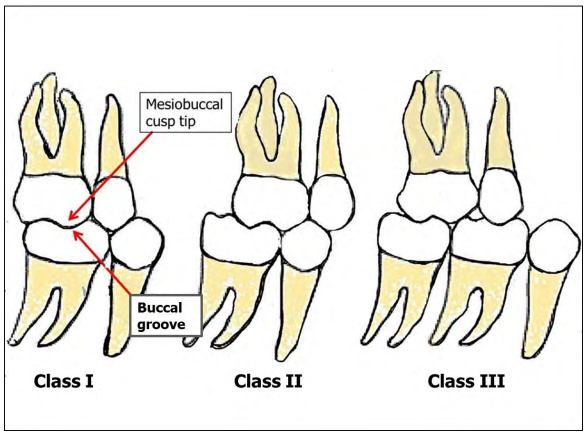
Dental Classification Molar Relationship

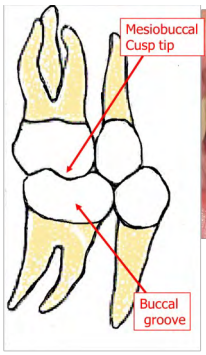
According to Andrews



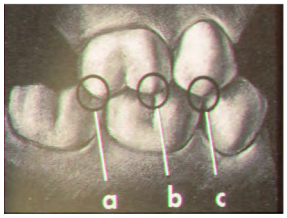
Class I molar relationship:

When the disto-marginal ridge of the maxillary first molar is touching the mesio-marginal ridge of the mandibular second molar.

The mesial cusp of the maxillary first molar is in the buccal groove of the mandibular first molar.



Class I molar relationship:
Please note how the pre-molars are fully intercuspated and the midline is usually correct.



Ideal Dental Class I

a. The disto-marginal ridge of the upper 1st molar touches the mesio-marginal ridge of the lower 2nd molar.

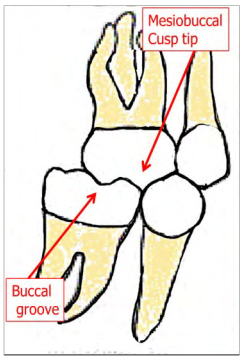
b. The mesiobuccal cusp of the upper 1st molar occludes in the buccal groove of the lower 1st molar.

c. The buccal cusp of the upper 2nd premolar occludes between the lower 1st molar and lower 2nd premolar.

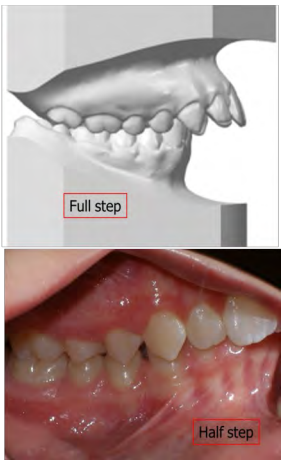
Class II molar relationship:

When the disto-marginal ridge of the maxillary first molar as well as mesio-buccal cusp is mesial to the class I position.

One will note the premolars may not be fully intercuspated, and the midline can be off.



Class II molar relationship

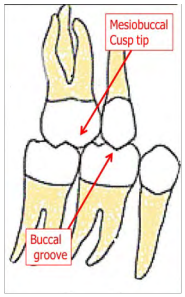


Class III molar relationship:

When the disto- marginal ridge of the maxillary first molar as well as mesio-buccal cusp is distal to the class I position.

One will note the premolars again will often not be intercuspated fully and the midline most likely will be off.

The anterior teeth will most likely be in an "end-on" relationship or the upper anteriors will lie lingually to the lower anteriors.



Class III molar relationship

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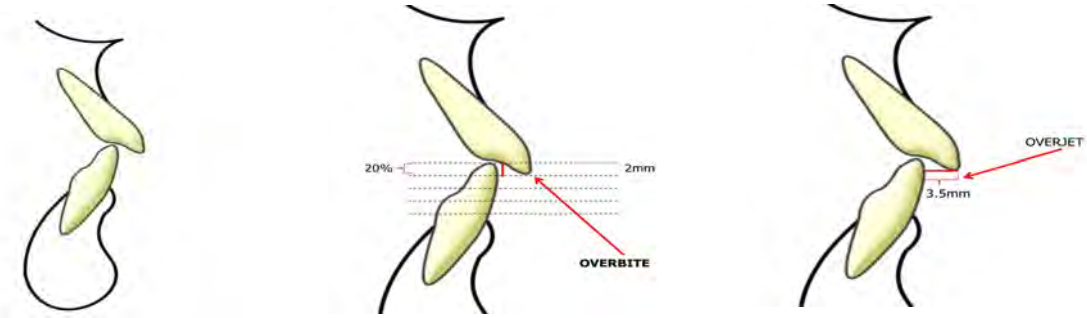
Anterior Teeth Relationships

Normal Class II Div I Class II Div II Class III Anterior Open Bite

Incisal Over-bite and Over-jet

- **Incisal Over-bite** measures in millimeters, the amount of vertical overlap of Maxillary incisor to Mandibular incisor. If no overlap is evident, then measure the opening between Mx1 and Mn 1 in which the measurement will be zero to negative.
- I like to refer to OB in %. The % of the Mandibular incisor that is draped by the maxillary incisor.
- **Incisal Over-jet** is measured in millimeters from the facial surface of the tip of Mn 1 to the facial surface of the tip of Mx 1. If Mx 1 is anterior to Mn 1 then the measurement is positive. If Mn 1 is anterior to Mx 1 then the measurement is negative.



The Study Models

- Of course we look at the molar classification: I, II or III
- And we look at the incisor arrangement: Over-bite, OverJet
- But, sometimes we need to access the space requirements transversely (side to side) and sagittally (front to back)

Sim Model Analysis

Super Easy Model Analysis

The Sim Analysis in Summary

- Dr. Sim related the needed (projected) expansion of the arches to the mesio-distal width of the lower incisors.
- He divided the lower incisors into five sizes.
- He projected the expansion necessary through basically an algebraic formula
- He also came up with a simple rule of thumb projecting the sagittal projection needed for the permanent premolars and cuspids to erupt uncrowded into the arches.

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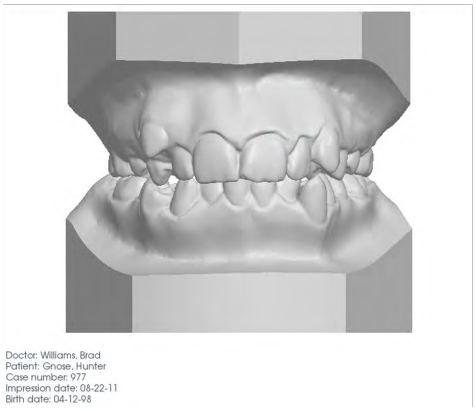
Other Arch Width Measurements

Fact: Both the Schwarz and Ponts analyses were developed in Europe, and utilized by dentists who used entirely functional orthopedic appliances.

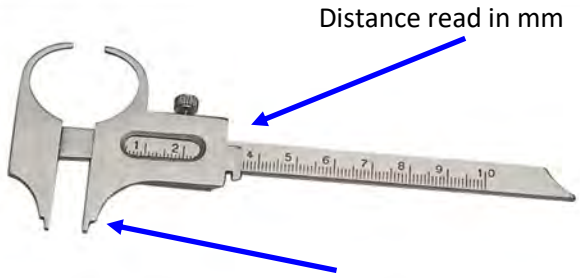
Fact: In the United States, we predominantly employ the fixed straight wire bracket system for arch development.

- Both Ponts and Schwarz analyses measure widths across the first bicuspids instead of the canines.
- Furthermore, the bicuspid and molar width across the arch are measured from the central or distal pit of each tooth.
- This makes for a less precise value than when measured against the outside surface as in the Sim analysis.
- From the comparison of the Sim analysis with both the Schwartz and Ponts analyses, one will find routinely that the European analyses often recommend nearly twice the amount of expansion to achieve the "ideal" arch widths.

Sim Model Analysis



Boley Gauge



Estimated Size of Lower Incisors as they Relate to Arch Width

- *Small* – canine width projected 30 mm
- *Medium-Small*- canine width projected 31-32 mm
- *Medium* – canine width projected 32.5 mm
- *Medium-Large* – canine width projected 33-34 mm
- *Large* – canine width projected 35 mm

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- The judgement of size is arbitrary. I think of a small individual incisor as being under 4mm in width and a large as greater than 7.5mm.
- The important thing is not to stress over it and make a decision. It is simply an estimate.
- One thing to remember: It will be better to over-estimate than to under-estimate so I recommend when in doubt, pick a bigger incisor size.

Algebra used by Dr. Sim to project the widths of the Upper/Lower 3's & 6's

- X = projected lower canine width in mm
- X+8mm = projected upper canine width in finished case
- X+20mm = projected lower first molar width in finished case
- X+24mm = projected upper first molar width in finished case

- Using the Williams' worksheet, you make the measurements on the casts and fill in the actual measurements.
- The table shown at the bottom of the worksheet with the heading "Range for incisor sizes", has all the algebra done and the projected numbers, (based on the incisor size you chose) are ready to plug into the projected widths side of the form.
- The important thing to remember is that all this algebra has already been done for you, you just have to decide what size incisors you see.
- **The actual measurements and that incisor size are your only contribution.**
- Plug in the numbers, subtract estimated from actual and you will have the predicted arch development required to finish the case.
- Again, It is always better to estimate toward the large size, because gaining too much space is better than not enough.

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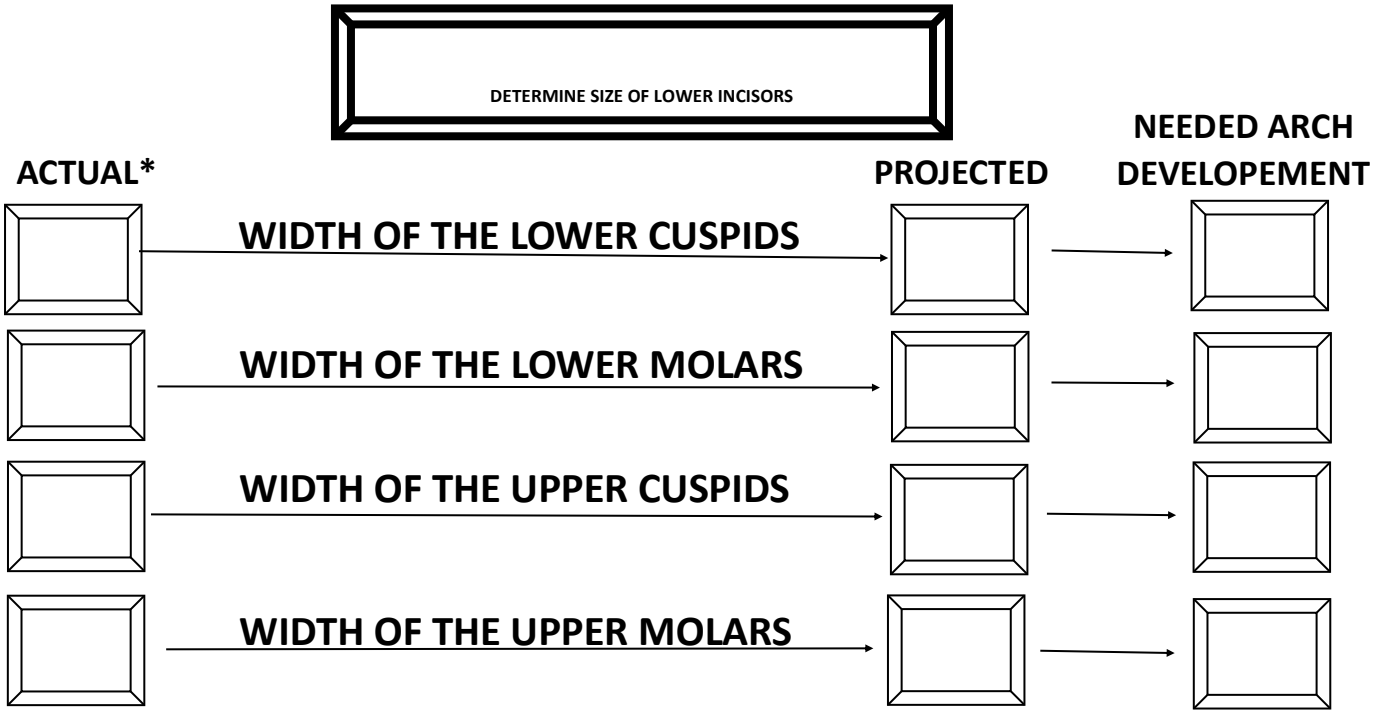
SIM ARCH WIDTH CAST ANALYSIS WORKSHEET



*IF MEASURING PRIMARY CUSPIDS - ADD 4MM TO THE ACTUAL #

*IF MEASURING PRIMARY 2ND MOLARS - ADD 4MM TO THE ACTUAL #

RANGE FOR INCISOR SIZES

SMALL	MEDIUM-SMALL	MEDIUM	MEDIUM-LARGE	LARGE
PROJECTED WIDTH OF THE LOWER CUSPIDS				
30mm	31-32mm	32.5mm	33-34mm	35mm
PROJECTED WIDTH OF THE LOWER MOLARS				
50mm	51mm	52-53mm	54mm	55mm
PROJECTED WIDTH OF THE UPPER CUSPIDS				
38mm	39mm	40-41mm	42mm	43mm
PROJECTED WIDTH OF THE UPPER MOLARS				
54mm	55mm	56-57mm	58mm	59mm

Formula allows for 2mm of post treatment relapse

SAGGITAL "BUCCAL SEGMENT" SPACE PREDICTION "21-23 Rule"

Measure the distance distal of the lateral incisor to the mesial of the 1st molar. 21mm in each of the lower segments and 23mm in the upper segments is required for the 3, 4 & 5. In races with larger teeth, such as Black and Hispanic , use 23-25 Rule.

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Example

Doctor: Williams, Brad
Patient: Gnose, Hunter
Case number: 977
Impression date: 08-22-11
Birth date: 04-12-98

Doctor: Williams, Brad
Patient: Gnose, Hunter
Case number: 977
Impression date: 08-22-11
Birth date: 04-12-98

This patient has large lower incisors

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WE WRITE IN THE INCISOR SIZE WE DECIDE IS APPROPRIATE FOR THE PATIENT WHICH IN THIS CASE IS LARGE.

SIM ARCH WIDTH CAST ANALYSIS WORK SHEET

LARGE
DETERMINE SIZE OF LOWER INCISORS

	ACTUAL	PROJECTED	NEEDED ARCH DEVELOPEMENT
WIDTH OF THE LOWER CUSPIDS			
WIDTH OF THE LOWER MOLARS			
WIDTH OF THE UPPER CUSPIDS			
WIDTH OF THE UPPER MOLARS			

*IF MEASURING PRIMARY CUSPIDS - ADD 4MM TO THE ACTUAL #
*IF MEASURING PRIMARY 2ND MOLARS - ADD 4MM TO THE ACTUAL #

THEN REFER TO THIS TABLE →

RANGE FOR INCISOR SIZES

SMALL	MEDIUM SMALL	MEDIUM	MEDIUM LARGE	LARGE
PROJECTED WIDTH OF THE LOWER CUSPIDS				
30mm	31-32mm	32.5mm	33-34mm	35mm
PROJECTED WIDTH OF THE LOWER MOLARS				
50mm	51mm	52-53mm	54mm	55mm
PROJECTED WIDTH OF THE UPPER CUSPIDS				
38mm	39mm	40-41mm	42mm	43mm
PROJECTED WIDTH OF THE UPPER MOLARS				
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Formula allows for 2mm of post treatment relapse

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RANGE FOR INCISOR SIZES

SMALL	MEDIUM SMALL	MEDIUM	MEDIUM LARGE	LARGE
PROJECTED WIDTH OF THE LOWER CUSPIDS				
30mm	31-32mm	32.5mm	33-34mm	35mm
PROJECTED WIDTH OF THE LOWER MOLARS				
50mm	51mm	52-53mm	54mm	55mm
PROJECTED WIDTH OF THE UPPER CUSPIDS				
38mm	39mm	40-41mm	42mm	43mm
PROJECTED WIDTH OF THE UPPER MOLARS				
54mm	55mm	56-57mm	58mm	59mm

Formula allows for 2mm of post treatment relapse

THEN THE PROJECTIONS FOR THAT INCISOR SIZE IS SELECTED FROM THIS TABLE PROVIDED IN THE WORKSHEET. We selected LARGE.

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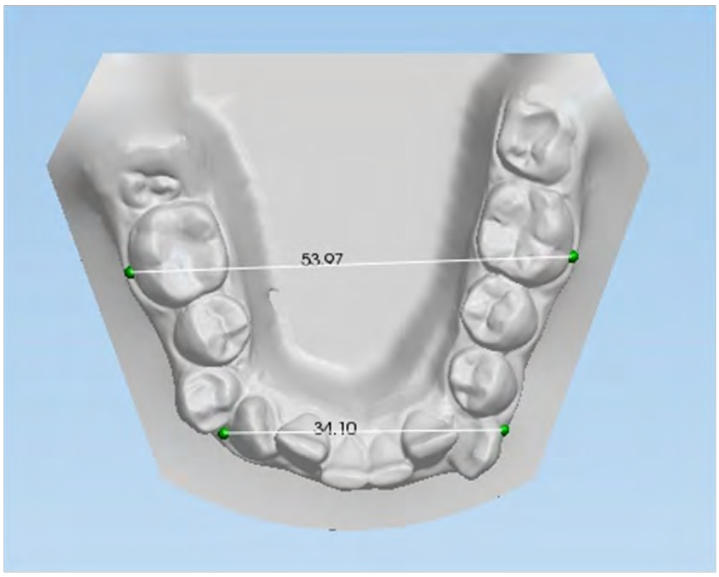
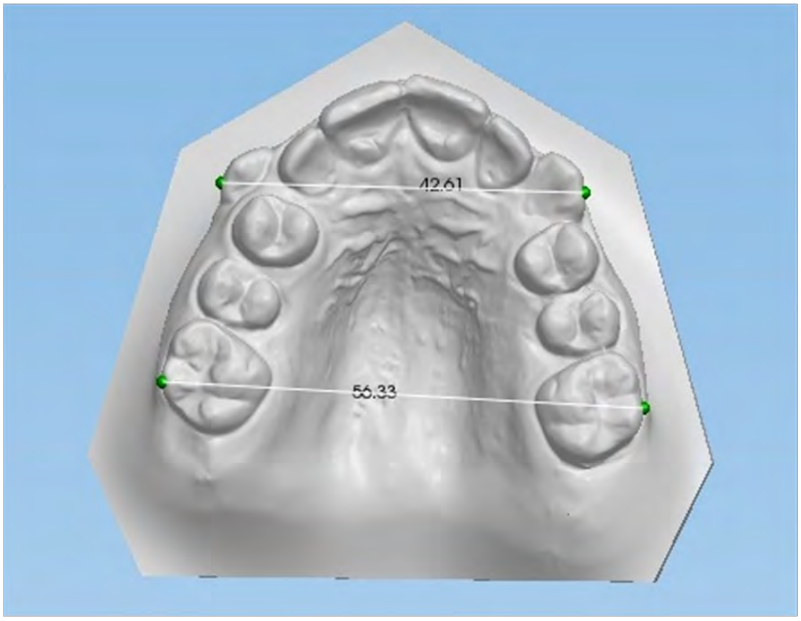
NEXT:

ACTUAL MEASUREMENTS ARE THEN MADE ON THE VIRTUAL MODELS, PRINTED TO ACTUAL SIZE FROM A DIGITAL MODEL SERVICE. SOME PROGRAMS WILL PROVIDE YOU WITH THE MEASURING TOOLS, OTHERWISE, YOU PRINT TO SCALE AND USE A MM RULER.



On the virtual model, printed to real size, measure the width of the lower canines, Placing the mm ruler at a point corresponding to the disto-facial gingival margins.

Likewise, measure the gingival margin at the buccal groove of the lower 1st molars



On the upper virtual model, printed to real size, measure the width of the upper canines, placing the mm ruler at a point corresponding to the disto-facial gingival margins.

Likewise, measure the gingival margin at the most transverse aspect of the upper 1st molars

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WRITE IN THE ACTUAL VALUES YOU MEASURED FROM THE MODEL

SIM ARCH WIDTH CAST ANALYSIS WORK SHEET

LARGE
DETERMINE SIZE OF LOWER INCISORS

ACTUAL *		PROJECTED	NEEDED ARCH DEVELOPEMENT
34	WIDTH OF THE LOWER CUSPIDS	35	1
54	WIDTH OF THE LOWER MOLARS	55	1
42.5	WIDTH OF THE UPPER CUSPIDS	43	.5
56	WIDTH OF THE UPPER MOLARS	59	3

*IF MEASURING PRIMARY CUSPIDS - ADD 4MM TO THE ACTUAL #

*IF MEASURING PRIMARY 2ND MOLARS - ADD 4MM TO THE ACTUAL #

THEN DO THE MATH!

RANGE FOR INCISOR SIZES

SMALL	MEDIUM SMALL	MEDIUM	MEDIUM LARGE	LARGE
PROJECTED WIDTH OF THE LOWER CUSPIDS				
30mm	31-32mm	32.5mm	33-34mm	35mm
PROJECTED WIDTH OF THE LOWER MOLARS				
50mm	51mm	52-53mm	54mm	55mm
PROJECTED WIDTH OF THE UPPER CUSPIDS				
38mm	39mm	40-41mm	42mm	43mm
PROJECTED WIDTH OF THE UPPER MOLARS				
54mm	55mm	56-57mm	58mm	59mm

Formula allows for 2mm of post treatment relapse

WRITE IN THE PROJECTED WIDTHS OBTAINED FROM THE TABLE

SAGGITAL "BUCCAL SEGMENT" SPACE PREDICTION "21-23 Rule" : Measure the distance distal of the lateral incisor to the mesial of the 1st molar. 21mm in each of the lower segments and 23mm in the upper segments is required for the 3, 4 & 5. In races with larger teeth, such as Black and Hispanic , use 23-25 Rule.

DISCUSSION:

BASED ON THIS ANALYSIS, "DOES THIS PATIENT NEED ANY TRANSVERSE APPLIANCES SUCH AS NPE OR RPE, IN ORDER OBTAIN THE ADDITIONAL ARCH WIDTH PREDICTED BY OUR SIM ANALYSIS?"

THE CASE LOOKS VERY CROWDED AND NARROW. WILL THE SWS BE ENOUGH TO GIVE US THE WIDTH AND EXPANSION WE NEED TO GET THESE TEETH IN?

SIM RESULTS:

- The total amount of additional arch width needed in the upper arch is 3.5mm.
- The total amount of additional arch width needed in the lower arch is 2.0mm.

How much arch width can we expect from our arch wire series?

Remember, in the permanent dentition, when treating with the BROAD ARCH straight wire appliance, one will gain up to 6 mm of arch width in the anterior region and up to 4 mm in the posterior region.

SO IN THIS CASE, WE SHOULD OBTAIN ENOUGH ARCH WIDTH FROM THE SWS TO GET ALL THE TEETH IN THE ARCH AND CREATE A GOOD OCCLUSION W/O USING ANY TRANSVERSE APPLIANCES.

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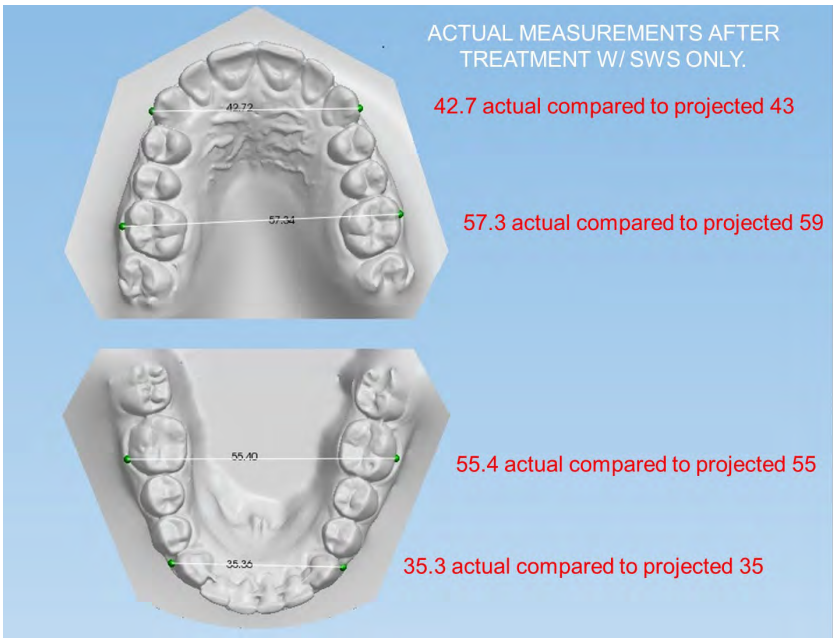
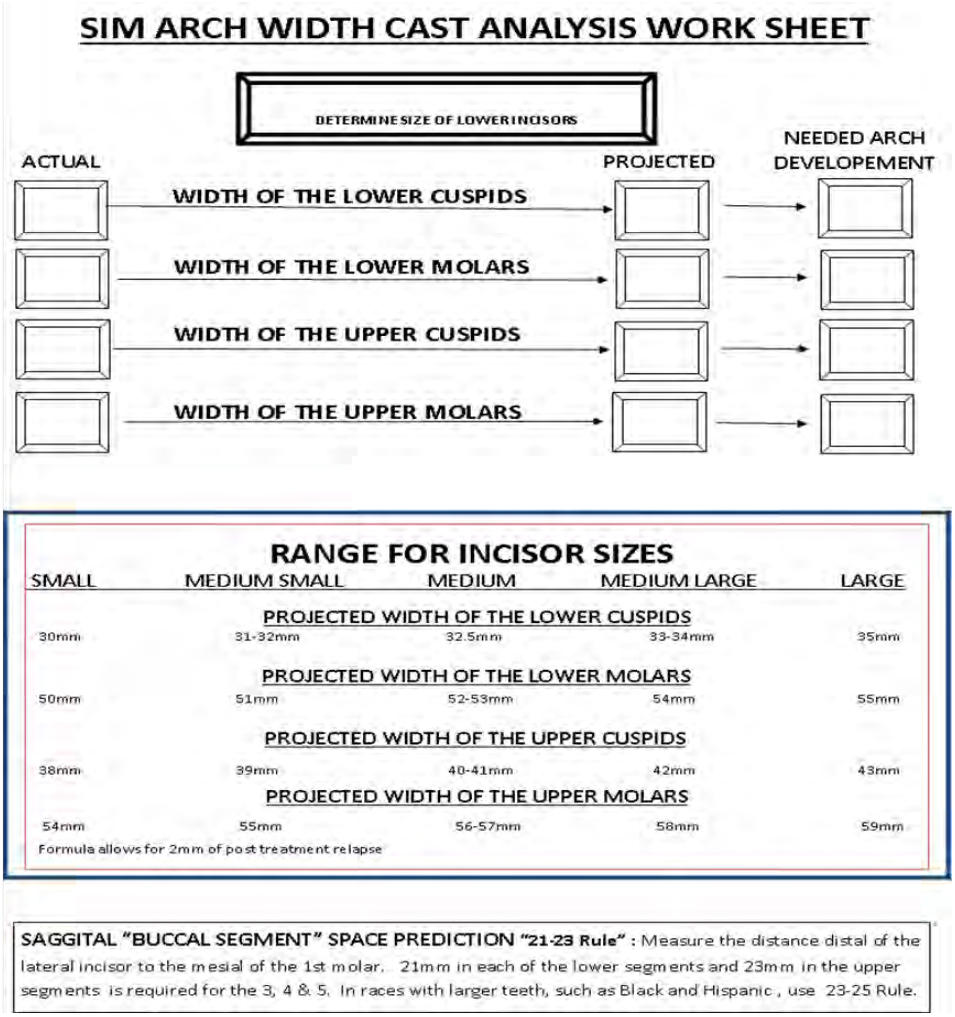


The 21-23 Rule

How it is employed

21 – 23 Rule



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21 – 23 mm of sagittal arch length is required to allow eruption of the:

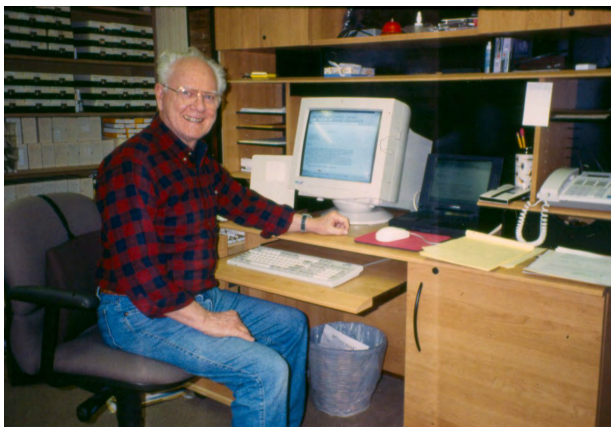
- 2nd premolar
- 1st premolar
- Canine
- So simply measure from mesial of 1st molar to distal of lateral and calculate arch crowding.

NOTE: This is a measurement taken from norms of a Caucasian with average sized teeth. One must look at the race and size of the anterior teeth to project more or less distance. In larger teeth, one would employ 23-25 mm instead.

Summary:
The Sim Analysis is a very useful measurement for needed arch development especially in the mixed dentition.

However, remember in the adult dentition, when treating with the straight wire appliance, one will gain up to 6 mm of arch width in the anterior region and up to 4 mm in the posterior region.

While I do not employ the Sim Analysis as much in the adult dentition personally, one can see if would still be very useful in assessing the projected needed development.



Dr. Joe Sim

- When I was in dental school, the two things besides Growth and Development, that the Orthodontic dept used to intimidate and confuse dental students was study model analysis and cephalometrics.
- We just looked at study models and the model analysis just isn't that hard, now let's look at the ceph!

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Soft Tissue (ST) Profile Analysis (Modified Esthetic Plane)

Horizontal soft tissue profile has been evaluated in hundreds of ways:

- Ricketts E-line (tip of nose to ST Pog)
- Holdaway's Harmony line. Tangent of Pog' and Ls'. He had 11 separate ST measurements.
- Steiner's S-line, ST Pog thru middle of the S curve Pronasale/Subn.
- And my fav, modified E-plane through anterior nares to ST Pog.

Concave

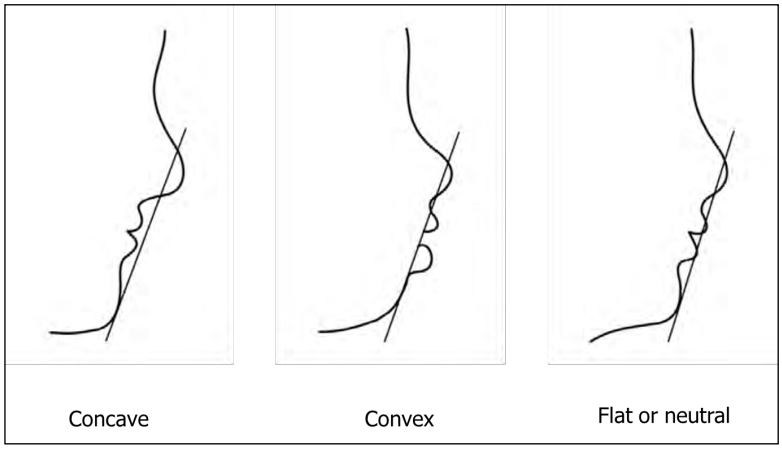
Straight

Convex

In this context, facial profile is referring to the lower half of the face, from the nose to the chin, not the entire face, forehead to chin.

Not this. **This.**

Modified E-plane tells us if the patient is:



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Modified E-Plane

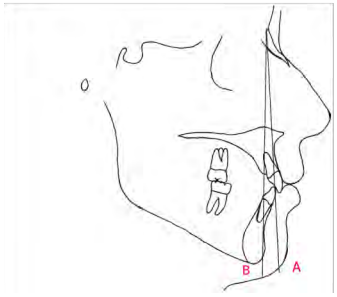
- Lips should fall on or slightly in front of line for a pleasing profile.
- Treatment should avoid bringing the lips forward in patients with convex (procumbent) profiles as this will worsen their convex appearance, too full.
- Patients with retruded lips or flat profiles should avoid premolar extractions, as this will worsen the concave appearance.
- Clinical studies have documented that the convexity of the profile will lessen with age. This is true of all individuals, male and female, regardless of treatment.
- Finishing cases somewhat full is not a concern, as the patient's profile will continue to flatten with age.

Skeletal Classification

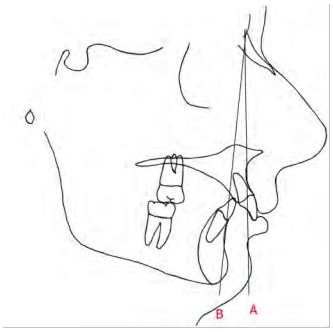
- Class I – when ANB is 0 to +4° and/or WITS is 0 to –2 mm
- Class II - when ANB is 5° or more and WITS greater than 0 mm
- Class III - when ANB is 0° or less and WITS is -2 mm or less

ANB

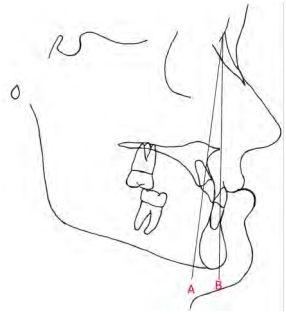
An angle created by the difference of SNA and SNB. This angle is a growth indicator as to the maxilla and mandible and their relationship to the cranial base.



Class I
0 – 4 degrees



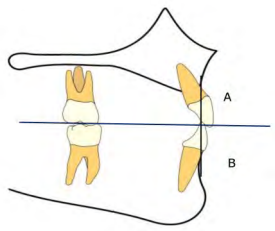
Class II
5 degrees
or more



Class III
Less than 0 degrees

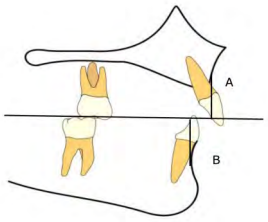
WITS (Apical Base)

Conceived primarily as a way to overcome the limitations of ANB as an indicator of jaw discrepancy. It is based on projections of points A and B to the occlusal plane, along which the linear difference between these points is measured. (WITS appraisal was named by Dr. Alex Jacobsen after his alma mater, Witwatersrand University, South Africa, where he popularized it, in assessing anterior-posterior jaw comparisons.)

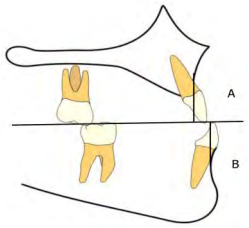


Balanced apical
base resulting in
Class I WITS

0 mm to –2 mm



Class II apic
relationship,
resulting in
WITS > tha



Class III apical base
relationship,
resulting in Class III
WITS < than -2 mm

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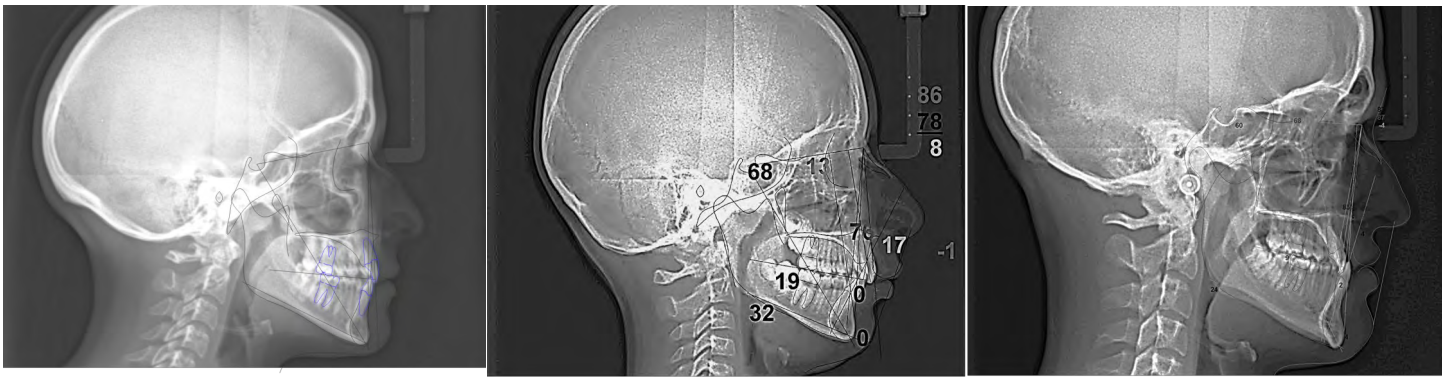
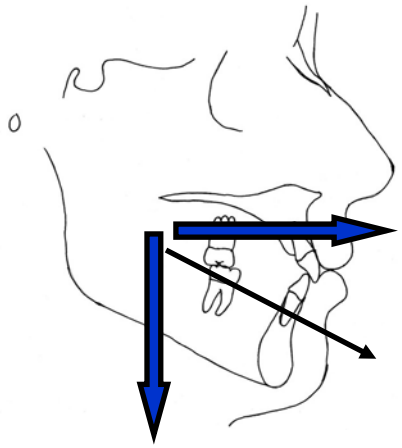


Skeletal Class I **(ANB = +2.9°; WITS = -0.7 mm)** **Skeletal Class II** **(ANB = +8°; WITS = 1.0 mm)** **Skeletal Class III** **(ANB = -3.8°; WITS = -8.0 mm)**

Skeletal Growth Patterns

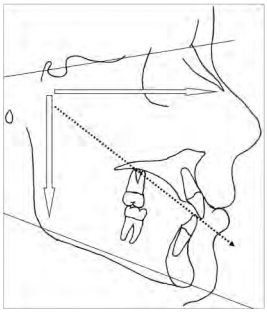
- Mesocephalic — Balanced growth — "neutral growth"
- Brachycepahic — Forward growth — "counter-clockwise growth"
- Dolicocephalic — Downward growth — "clockwise growth"



The growth pattern of the patient is very important, as any force in orthodontics causes the posterior teeth to erupt, opening the bite.

In the following slides, the three growth patterns are considered.

- In the first slide, a neutral or mesocephalic growth pattern is shown. Increasing the vertical dimension, that is, opening the bite, is usually not an issue.
- In the second slide, the face exhibits a counter-clockwise or brachycephalic growth pattern and increasing the vertical, that is, opening the bite, is often advantageous.
- In the third slide however, the face exhibits a clockwise or dolicocephalic growth pattern and any vertical increase is usually contra-indicated. Open bites are extremely difficult to correct.

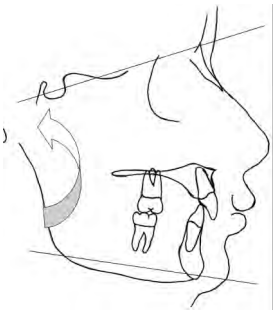


GoGn to SN

Mesocephalic GoGn-SN

Normal Growth Angle

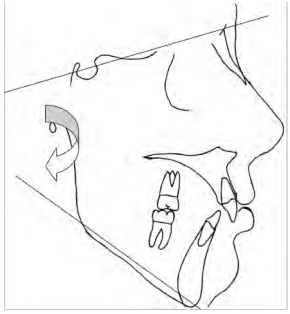
32 +/- 5 degrees



Brachycephalic GoGn-SN

Closed Angle Horizontal Growth
Counter clockwise growth

< 27 degrees



Dolicocephalic GoGn-Sn

Open angle Vertical Growth

Clockwise Growth

> 37 degrees

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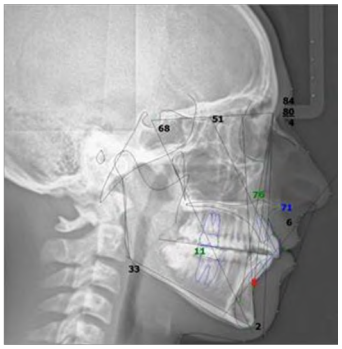
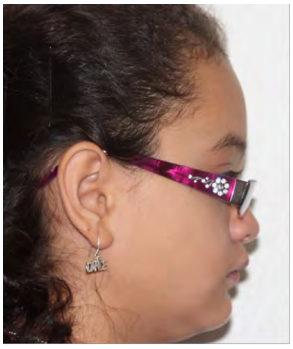
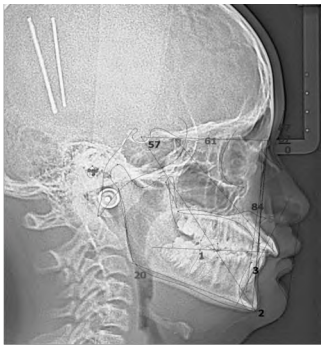
Mesocephalic or Neutral Growth



GoGn = 33 degrees

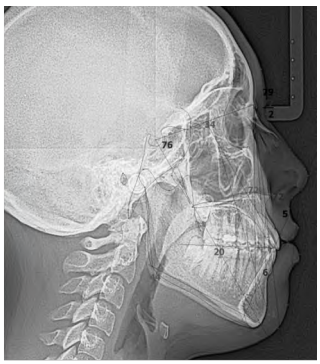


Brachycephalic Forward Growth



GoGn = 20 degrees

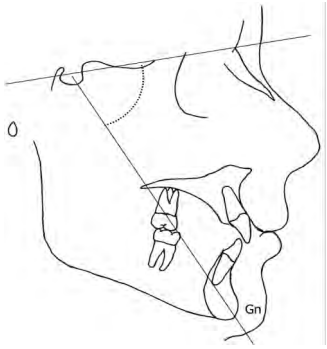
Dolicocephalic Downward Growth



GoGn = 44 degrees

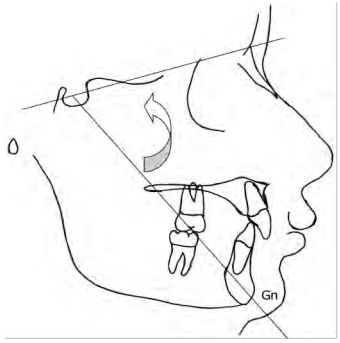
Y-AXIS

The Y-axis is a line measured from Sella to Gnathion, and forms an angle with Sella-Nasion (SN). It is an indicator used to predict a normal growth pattern, a clockwise growth pattern, or a counter-clockwise growth pattern. Some clinicians employ the Sella-Nasion line while others the Frankfort horizontal. The first figure indicates a normal angle and normal growth pattern. The second figure has a closed angle and indicates a counter-clockwise growth pattern. The third figure has an open angle and indicates a clockwise growth pattern.



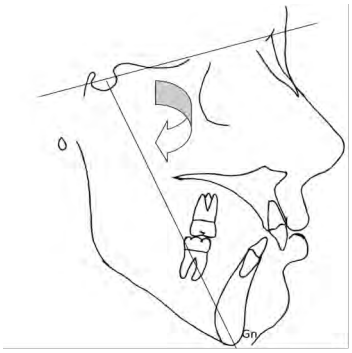
Neutral Growth Y-Axis

Y-axis from Sn = 67 +/- 3 degrees



Horizontal Growth Y-Axis

Y-Axis from SN < 64 degrees



Vertical Growth Y-Axis

Y-axis from SN > 70 degrees

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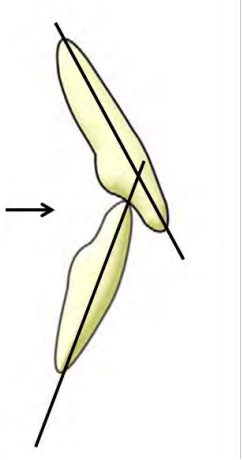
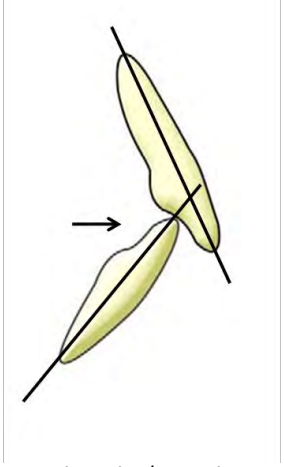
Inter-Incisal Angulation

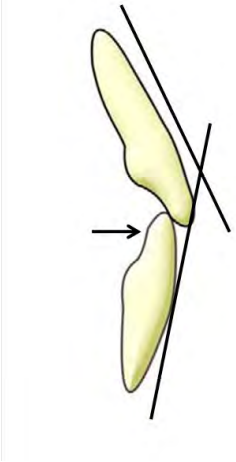
The significance of a normal interincisal angle is related to stability. It has been researched that an interincisal angle of around 132 degrees provides a long term stable result.



Normal 1/1 angle
132° +/- 4°



Closed 1/1 angle
< 128° Protrusive



Open 1/1 angle
>136° Retrusive

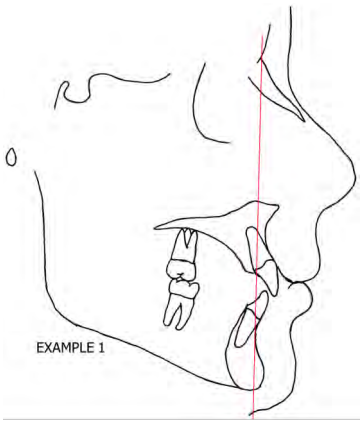
It has been suggested from research that an interincisal angle of around 132 degrees provides a long term, more stable bite.

N-B Line

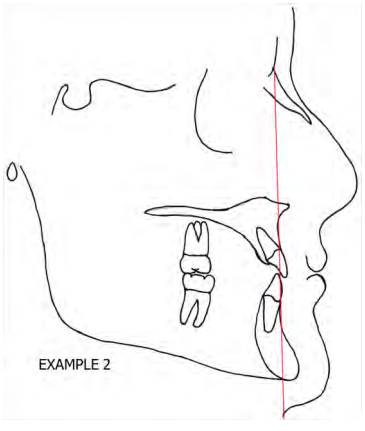
The significance of the NB line in an ideal face is strongly weighted by Steiner:

- The measurement of L1 to NB and the measurement of Pogonion to NB should be a minimum of a 1 to 1 ratio.
- This is simply an indicator.
- The first figure shows an ideal relationship
- The middle figure indicates the lower teeth need to move forward
- The third figure indicates a very full face, corrected by mandibular distalization, extractions, or surgery.

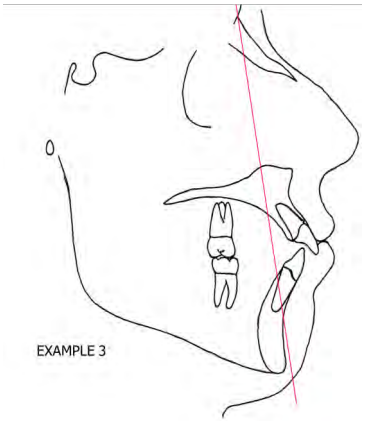
Note: These measurements were based on Caucasian norms. If the face looks good and the L1 to NB is +8mm, I will treat to esthetics over cephalometrics.



Ideal relationship or ratio of NB to lower 1 and Pog
NB to Lower 1 = +4mm
NB to Po = +4mm



Here the lower teeth need to move forward.
NB to Lower 1 = 0mm
NB to Po = +5mm



Here's a very full face, corrected by mandibular distalization, extractions or surgery.
NB to Lower 1 = +8mm
NB to Po = 0mm

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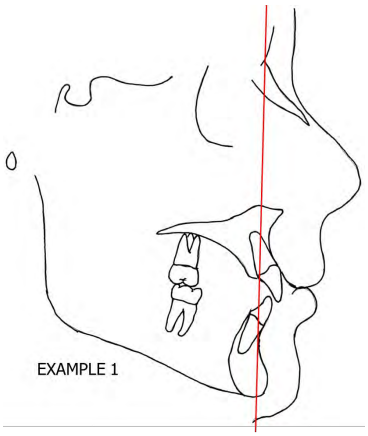
Determining Crowding by Cephalometric Analysis

The significance of cephalometric crowding is in an ideal face (based on Caucasian measurements):

- The first figure shows a good ratio with measurements of L1 to NB and Pog to NB of +4mm. Good ratio and assuming that there is no crowding, there is enough room for all of the teeth to erupt into the arch without moving the lower anteriors, a good profile.
- The second figure indicates the lower anteriors could be moved forward even if there is crowding, it will help the ratio and improve the profile.
- The third figure indicates the lower anteriors have to move back to get the right ratio, which requires the posterior teeth to be distalized in order to bring the lower anteriors back, just as though there was crowding.

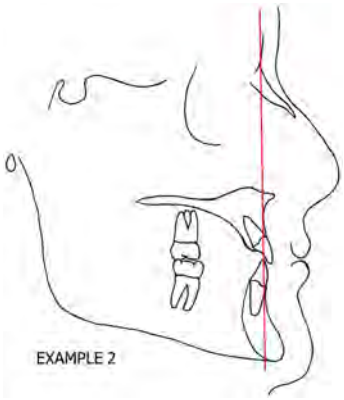


The following example shows a good ratio with measurements of L1 to NB and Pog to NB of +4mm.

Good ratio and assuming there is no crowding, there is enough room for all of the teeth to erupt into the arch without moving the lower anteriors, a good profile.

NB to Lower 1 = +4mm

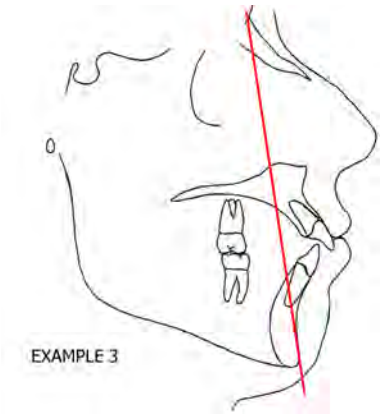
NB to Po = +4mm



The second figure indicates the lower anteriors could be moved forward even if there is crowding, it will help the ratio and improve the profile.

NB to Lower 1 = 0mm

NB to Po = +5mm



The third figure indicates the lower anteriors have to move back to get the right ratio, which requires the posterior teeth to be distalized in order to bring the lower anteriors back, just as though there was crowding, even if there is none.

NB to Lower 1 = +8mm

NB to Po = 0mm

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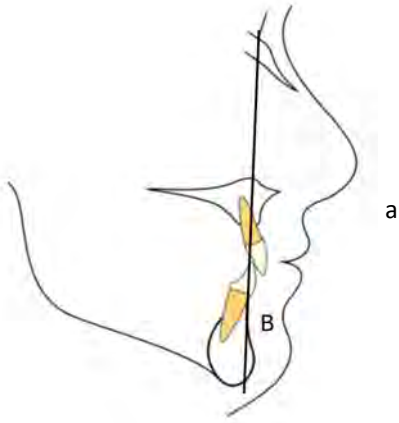
Pogonion

- The growth of Pogonion is important in the diagnosis of an individual.
- Growth spurts can be predicted in the patient, knowing the age, sex, and NB to Po measurement. Pogonion in boys begin to grow between the ages of 12 and 16
- The girls, Pogonion will grow between the ages of 10 and 13. This is not hard fast rule, and you will learn there is always exception. Look at the biological parents. Facial patterns are passed down genetically.



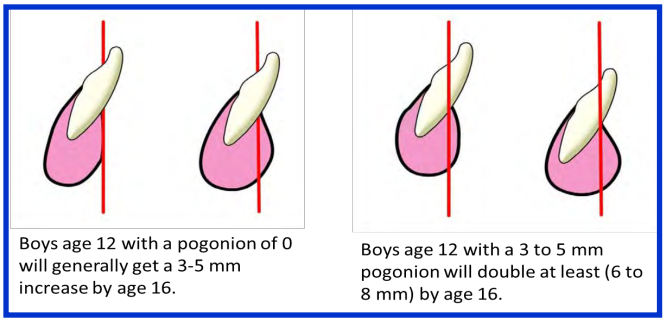
a

Possible Pogonion Growth:

Boys are to be watched carefully as the pogonion grows more significantly than in girls.

Age	Boys	Girls
10	--	0 to 3-4 mm
11	--	0 to 2-3 mm
12	0 to 3-5 mm	0 to 1-2 mm
13	0 to 2-4 mm	0 to ½-1 mm
14	0 to 1-2 mm	--
16	0 to 0 mm	--

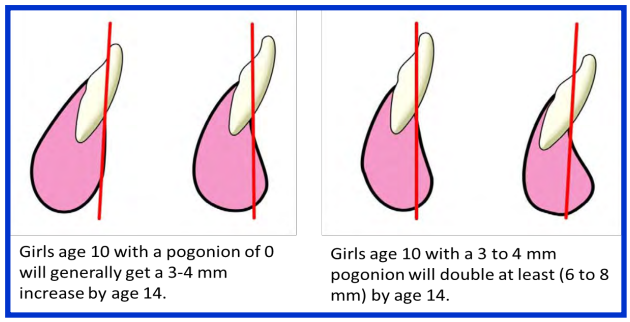
BOYS



Boys age 12 with a pogonion of 0 will generally get a 3-5 mm increase by age 16.

Boys age 12 with a 3 to 5 mm pogonion will double at least (6 to 8 mm) by age 16.

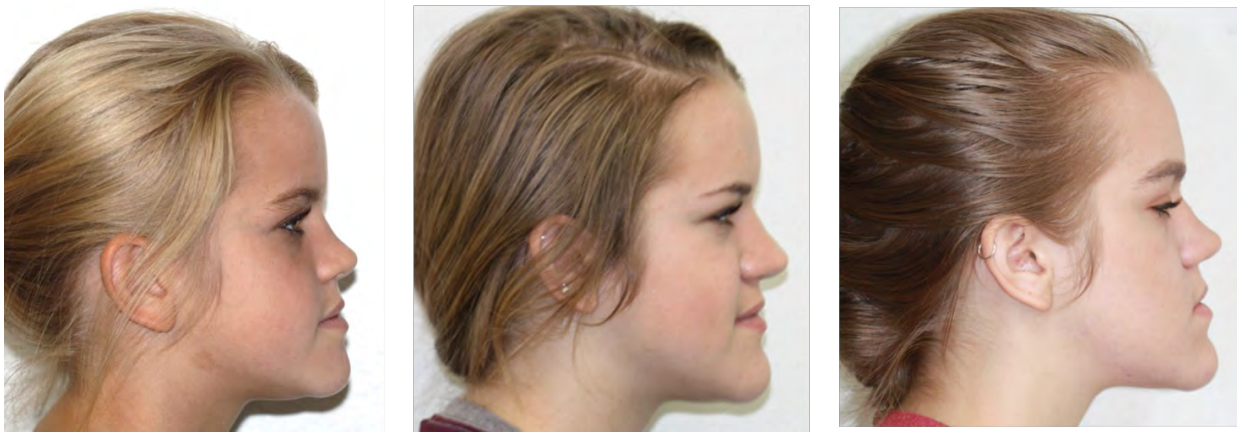
GIRLS



Girls age 10 with a pogonion of 0 will generally get a 3-4 mm increase by age 14.

Girls age 10 with a 3 to 4 mm pogonion will double at least (6 to 8 mm) by age 14.

11yo **13yo** **16 yo**



Sometimes Growth Spurts Occur in Girls Too

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Establishing Incisor to NB Relationship

- Look at the age of the patient and then determine how much Pogonion should grow.
- You can then decide whether to advance or distalize your lower incisors.
- Dentitions that have a minimum of 1:1 ratio between the lower incisor and the Pogonion will usually have a well-balanced face and be very stable.
- This is a Steiner principle. He developed a series of compromises that violate this relationship and still look good.

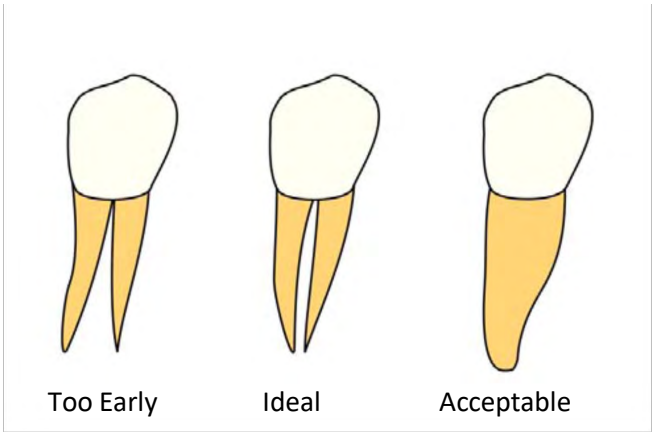
Cephalometric Diagnosis Summary

- Profile tells us if lips balanced, concave, neutral, or convex.
- ANB tell us if they are in normal limits of orthodontic treatment or if the skeletal problems are too great to treat with ortho alone.
- WITS confirms our concerns about normal limits.
- Check GoGn, Y-axis, and to determine if the patient is a clockwise, counter-clockwise, or neutral grower and whether they fall within growth parameters that are within acceptable limits.
- These simple assessments define the “box” cases fall within. We use this information to help decide if we treat or refer.

When Do I Start Treatment?

Lower Cuspids

- Lower canines are a good indicator as to when to begin orthodontic treatment in late adolescence.
- As the root begins to close, it is a good time to bracket and band the teeth.
- All of the permanent teeth (other than wisdom teeth) should be fully erupted into the dental arches within two years of this signal.
- Use the Pano or PA’s to make this determination.



The cuspid on the left is a bit premature as the root is still open. Completion of the case may be delayed. The cuspid in the center is closing and ideal treatment time.

The cuspid on the right is closed and treatment is of course acceptable.

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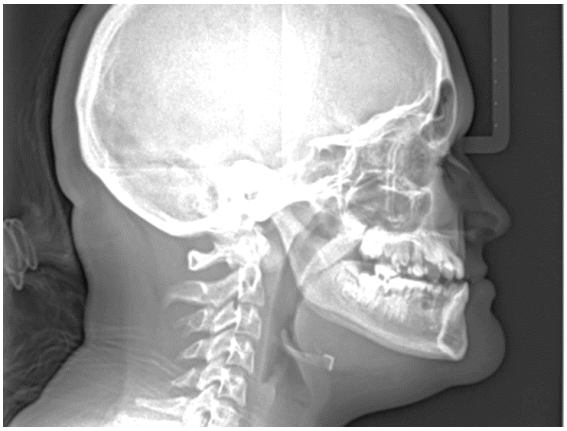
Crossbites

- Crossbite can involve a single tooth or a group of teeth. It can be classified in anterior or posterior and bilateral or unilateral.
- An anterior crossbite should not be referred to as negative overjet unless the condition is the result of typical class III skeletal relations (prognathism).
- Posterior crossbite is often correlated to a narrow maxilla and upper dental arch. A posterior cross-bite can be unilateral or bilateral. Unilateral cross-bite often determines a lateral shift of the mandibular position, which can become structural if left untreated for a long time during growth, leading to skeletal asymmetries.

These are negative overjets created by true skeletal Class III prognathism which creates an anterior cross bite as well.



Crossbites

- Correct cross bites as soon as they are diagnosed
- Cross bites are corrected more easily in growing younger individuals
- Cross bites are extremely difficult to correct on individuals over 17 years of age.
- Cross bites are more easily corrected in individuals with high palatal vaults.
- Cross bites may be corrected with functional removable appliances, fixed functional appliances or rapid palatal expansion.

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Anterior Crossbites



Single Tooth Crossbite

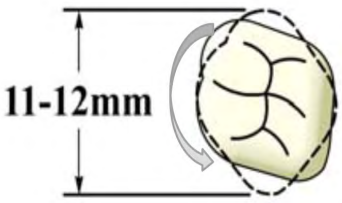

Bilateral Posterior Crossbites

Unilateral Crossbite

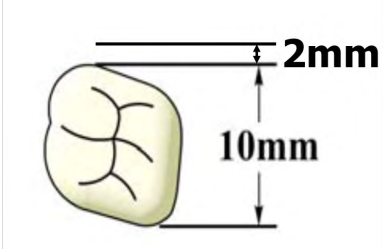

Buccal “Scissor” Cross Bites

Rotated upper Maxillary First Molars

- A significant mesio-lingual rotation is present in 90% of all Class II malocclusions
- The importance of this in diagnosis is that you can gain 1-2mm in arch length, to alleviate crowding in the arch simply by rotating the upper 1st molars.
- Pictured below is a transpalatal arch which will rotate the upper 1st molars. The Transpalatal Bar or NPE has been designed for:
    - Rotation of 1st and 2nd molars
    - Expansion
    - Torque
    - Cross bites
    - Distalization
    - Expansion and contraction



Typical mesio-lingual molar rotation



De-rotation of molar results in 2mm arch length increases

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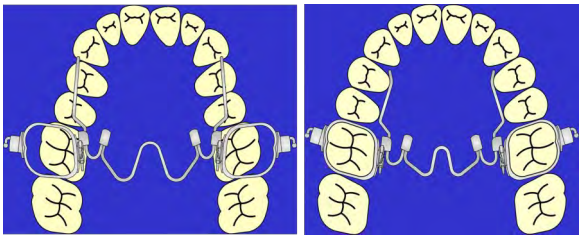
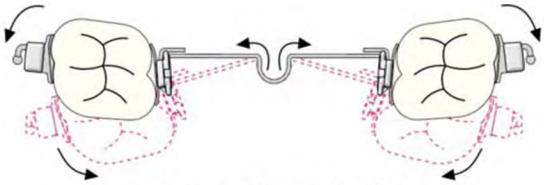
Expansion and Rotation with an NPE

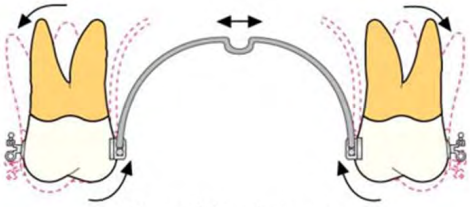
The Nitanium Palatal Expander



BRT, Rotation and Distalization with a Transpalatal Bar



Rotation and Distalization

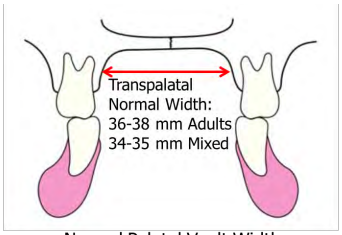


Buccal Root Torque

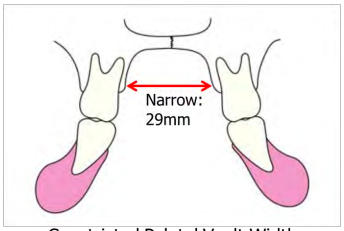
Either the NPE or the TB can also create distalization, contraction of the upper arch and create buccal root torque in addition to expansion. Very valuable tools in trying to achieve Andrew's Six Keys of Occlusion.

The Palatal Vault Height and Width

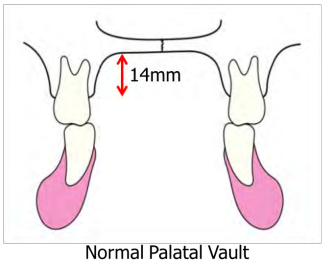
- The height and width of the palatal vault is very important in diagnosis.
- A normal height measured from the floor of the palate to the tip of the lingual 1st molar cusp is normally 14mm.
- The width measured from the gingival of the lingual surface of the upper 1st molars is normally 36-38mm in adults and 34-35mm in mixed dentitions.
- A high, narrow palatal vault indicates an airway compromise, and some type of palatal expansion will be necessary. A wide, low palatal vault is very difficult to expand with any appliance.



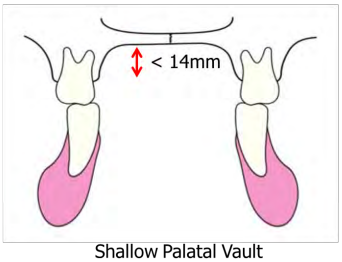
Normal Palatal Vault Width



Constricted Palatal Vault Width



Normal Palatal Vault



Shallow Palatal Vault

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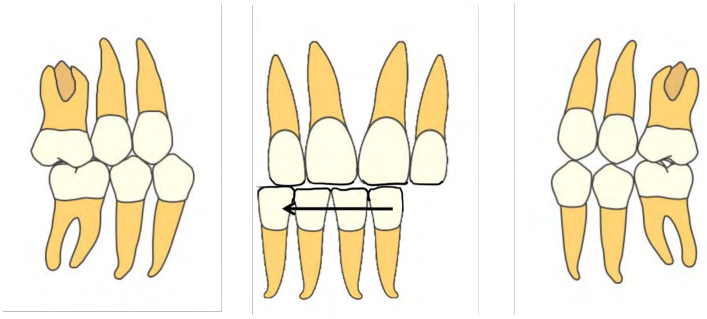
Evaluation of Premolar Position

- If the upper premolars are in the embrasures of the lowers on one side, but are riding up the inclines of the lower premolars on the other side, two things will be apparent in the occlusion. There will be a midline discrepancy and/or an overjet problem.
- The average width of a lower premolar is 8mm. If the premolars have end on end occlusion, you will have to move the upper premolars distally approximately 4mm to establish the solid Class I occlusion and nice overjet.
- If you have a full Class II occlusion, you will have to move the upper premolars distally approximately 8mm. You should take into account whether or not there is tooth size discrepancy.

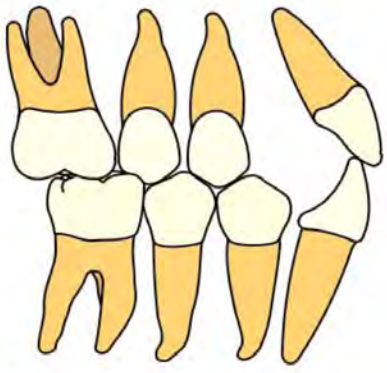


If you have a patient with a "socked in" Class I molar on one side, but a Class II molar on the other side, then the side with Class II molar will have upper premolars which are riding up on the lower premolars, and one of two things will happen:

1. The midline will be off to the opposite side of the Class II side.
2. The anteriors will be flared out.

Correct Premolar Position and Occlusion

- To achieve the proper overbite, overjet, and correct midline, the upper premolars have to fit in the embrasures of the lower premolars and molar.
- When the upper premolars start to ride up the inclines of the lower premolars then you will not be able to get the proper overjet of correct midline.



Class I

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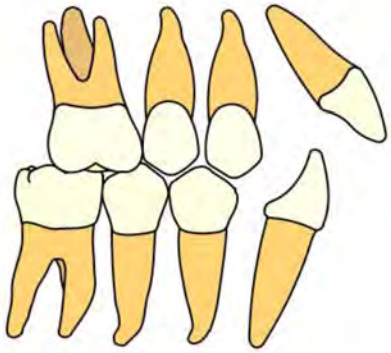
Full Class II Occlusion

In a class II occlusion, the upper premolars are either riding up the inclines of the lower premolars or are past as pictured above. This creates midline discrepancies and overjet.

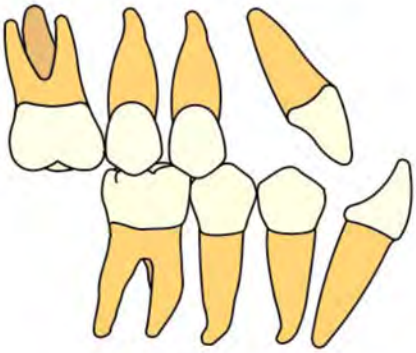
Full Class II



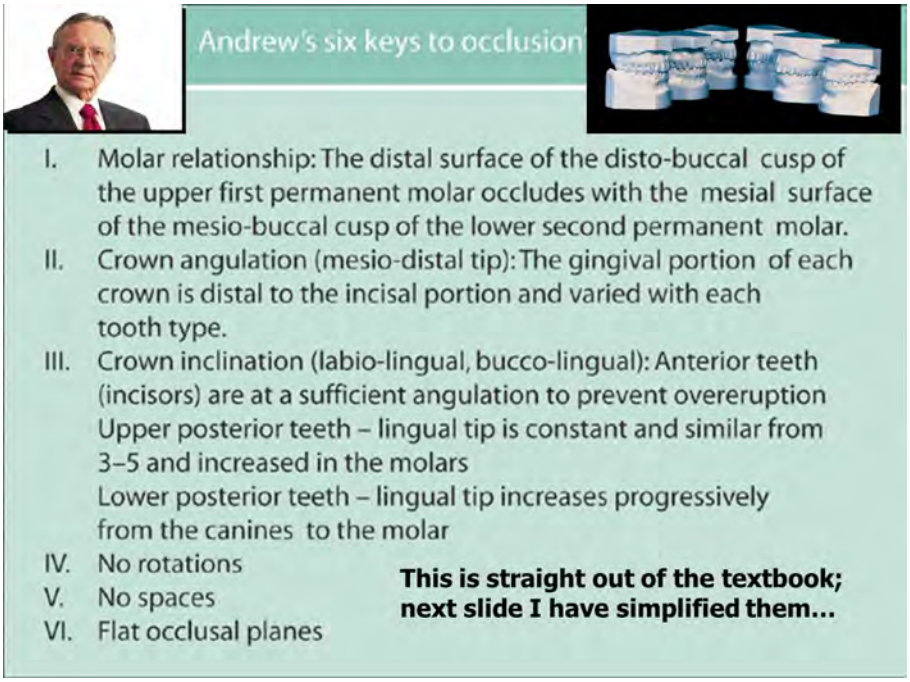
Full Class III Occlusion

In a Class III occlusion, the premolars are riding up the distal inclines of the lower teeth and will cause end on occlusion, negative bites, and midline issues.

Full Class III



Goals of Treatment



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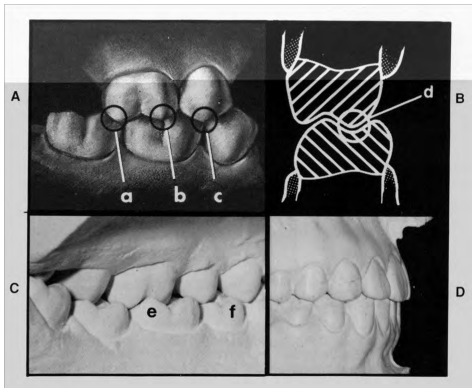
Goal of Orthodontics: To establish the Six Keys of Occlusion per Dr. Laurence Andrews

- Key I – Molar Relationship
- Key II- Crown Inclination – The Mesio-Distal "Tip"
- Key III-Crown Inclination- The Labio-Lingual or Bucco-Lingual "Torque"
- Key IV-Rotations
- Key V-Tight Contacts
- Key VI-Curve of Spee

1st Key: Molar Relationship

Upper 6 distal buccal cusp, contacts the lower 7 mesial buccal cusp

CLASS I MOLAR RELATIONSHIP



- The non-orthodontic normal models consistently demonstrated that the distal surface of the disto-buccal cusp of the upper first permanent molar occluded with the mesial surface of the mesial buccal cusp of the lower second molar.
- The closer the distal surface of the disto-buccal cusp of the upper first permanent molar approaches the mesial surfaces of the mesio-buccal cusp of the lower second molar, the better the opportunity for normal occlusion.

Observe how the distal cups the lower molar. Look at the U6 distobuccal cusp touching the L7 mesiobuccal cusp.

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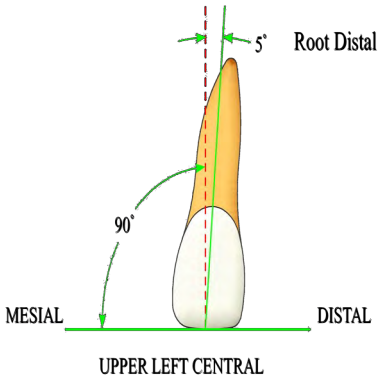
2nd Key: Crown Tip (Angulation)

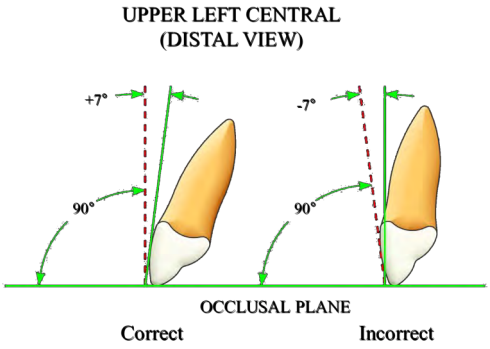
- The gingival portion of the long axes of all crowns is more distal than the incisal portion.
- Crown tip is expressed in degrees, plus or minus.



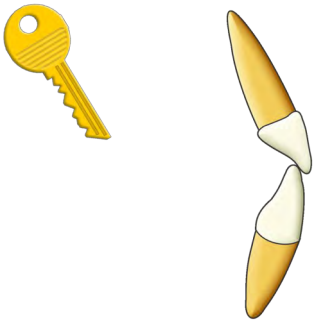
3rd Key: Crown Torque (Inclination)

CROWN INCLINATION (LABIOLINGUAL OR BUCCOLINGUAL INCLINATION)

- Generally speaking, the anterior teeth have lingual root torque.
- The canines are relatively straight up and down
- The posterior teeth have buccal root torque.

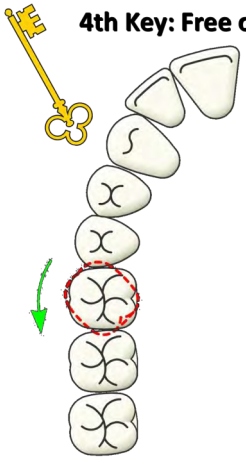


Proper Crown Torque During Occlusion



Note: Lingual root torque

4th Key: Free of Rotations



Dotted line shows a mesially rotated molar taking up space, which would cause crowding

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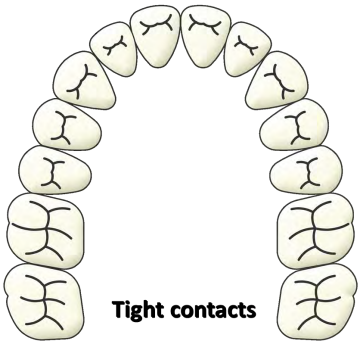
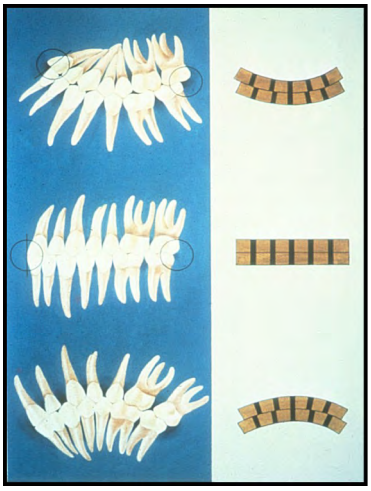
5th Key: Correct Spacing



6th Key: Curve of Spee

FLAT CURVE OF SPEE



Concave curve of spee

Flat curve of spee

Convex curve of spee

- So, all of this data from our exam, study models, ceph analysis, pano, photos helps us produce the diagnosis.
- From this we can determine if we will treat the case or refer.
- We will go into treatment planning next.
- But, just to help beginning doctors, the next several slides review the parameters that I suggest for treatment criteria.
- These ten simple rules create the box that we try to stay inside when we treat ortho cases in general practice.
- Doctors who stay within this “box” have smooth sailing; nice cases that treat out the way we expect, without complications.

One More Thing:

- You can draw your own box. Create your own parameters.
- Maybe you won’t ever be comfortable with Phase II. You just want to do Phase I.
- Or maybe you don’t want any Phase II class II’s.
- It is all up to you!
- By adding orthodontics to the current services you provide, you increase your bottom line, especially if you are not as busy as you want to be or you are looking for an easier way to do dentistry.

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General Guidelines for Patient Selection

Criteria For Beginning Doctors

1. Avoid treating adults as a beginning doctor.
2. Treat both arches, not one (unless it is a crossbite).
3. Do not treat patients with TMD.
4. Do not treat compromised patients OR PITA'S (multiple missing teeth; medical conditions; etc.) (BAD ATTITUDES).
5. Treat patients with a WITS which falls generally within a range of -3 mm and + 6 mm.
6. Do not treat full-step class II's. Treat patients with an ANB which falls generally within a range between 0-8°.
7. GoGn should generally be no greater than 37° and no less than 27°.
8. Avoid Class III cases until you have more experience.
9. Treat Class I and Class II dental and skeletal cases.
10. Treat all cases non-extraction for nine months.

1. Avoid Treating Adults As A Beginning Doctor.

- Adults are more difficult to expand and distalize because their occlusions are so "ground in".
- Adults have lots of restorations creating iatrogenic Bolton discrepancies.
- Adult dentitions are often mutilated and require management of spaces, bridgework, pontics, etc.
- I am not saying that adults can't be treated by GP's, just avoid those cases in the beginning.
- Reality is that no one is probably better qualified to treat the adult cases than GP ortho practitioner.

2. Treat Both Arches, Not One. Do Not Do One Arch Treatment.

- As the form of the arch follows the form of the arch wire you are using, treating one arch is very difficult. The two arches will not match each other after treatment.
- Placing the brackets perfectly in alignment so not to move the teeth in the vertical place, affecting the occlusion is also very difficult.
- There is no anchorage from the lower arch to employ cross arch elastics, springs, etc.
- When a patient asks you to treat in "one little area" Just say "no".
- Exception is made for adult minor anterior crowding or a cross bite. Employing an aligner with IPR or some other lab-fab appliance is best -DO NOT BRACKET if possible.
- Exception is made for phase I's in which cross bite correction or expansion is required but typically it is still better to treat in both arches under these circumstances.

3. Do Not Treat Patients With TMD

- If a patient suffers from TMD, you could possibly make the patient worse.
- If you have a rich background in TMD, you may incorporate these patients into your ortho practice after you gain more knowledge from this course.
- The joint should be treated first prior to orthodontics.

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4. Do Not Treat Compromised Patients; Emotionally, Physically, Mentally, Medically Or Dentally

- Compromised patients range from debilitating diseases & developmental or medical syndromes such as cleft palates, mental retardation, various syndromes etc. All the way over to simply combative non-compliant, bad attitude types or patients with unreasonable expectations.
- Start with the simple class I and class II cases with permanent teeth and good attitudes allowing you to gain knowledge and skill.
- Compromised patients will decrease your confidence and affect your future orthodontic mental state.

5. Don't Treat Severe Class II Or III Cases. Treat Patients With A WITS Which Falls Generally Within A Range Of –3mm And +6mm.

- The SW appliance works well in cases that fall inside the cephalometric norms.
- As you get further outside this "box", the appliance may not respond predictably.
- For example, in class II cases, typically, the bite opens as you distalize while correcting the sagittal issues.
- In class III cases, bite opening becomes even worse than class II cases.
- Stay inside "the box" as much as possible, then the SW appliance will work the way it is suppose to and you will get predictable results.

6. Don't Treat Full-Step Class II's. Treat Patients With An ANB Which Falls Generally Within A Range Between 0-8°.

- Full step class II malocclusions (full cusp discrepancy) are very difficult to treat.
- They are often long, tenuous cases, requiring tremendous cooperation from the patients wearing elastics. The result is often distalization & reposturing.
- The patients often end up with a dual bite as you have repositioned the mandible along with the distalization.
- If you treat this type of case, I recommend a distalization appliance without class II elastics, which means mandibular reposturing appliances.

7. Diagnosed early, these may go better if the sagittal is addressed aggressively in phase I with distalization and reposturing appliances. **GoGn Should Generally Be No Greater Than 37° And No Less Than 27 °.**

- As teeth move, they erupt.
- For every mm a posterior tooth erupts, the anterior overbite opens 3mm (a 3:1 ratio in general).
- Any appliance in orthodontics moves the teeth.
- Any distalization just makes this worse.
- The GoGn will continue to increase as the case progresses, resulting in an anterior open bite.
- These are difficult to treat and correct.
- Low growth angles are very hard to open and almost always have deep bites and excessive Curve of Spee. In low angle cases, the bite may not open, even with AC/RC.
- The bite may not open even with brackets placed to open the bite.
- This results in anterior bracket interferences with the lingual surface of the upper anteriors hitting the lower brackets thus not allowing the proper sagittal correction leaving the case with more OJ and OB than is ideal.
- It could even cause the class I molar relationship to fail as the case is distalized.
- Very hard to treat and to retain.

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8. Avoid Class III Cases Until You Have More Experience.

- Class III skeletal cases often have late growth spurts.
- Class III cases often have long growth angles.
- Class III require distalization often opening the GoGn more.
- Class III cases often require extraction mechanics or orthognathic surgery.

9. Treat Class I And Class II Dental And Skeletal Cases

- Gain clinical and classroom knowledge at first.
- These are the “bread and butter” cases.
- These are the profitable cases.
- These are the predictable cases.
- These will build your confidence to take on harder cases in the future.

10. Treat All Cases For Nine Months Non-Extraction.

- I do not recommend extraction orthodontics for beginners. I use and teach a non-extraction technique.
- Full profiles with full lips are what patients today are looking for. They even buy lips!
- Expanded arches make bigger air ways which is always considered better by sleep apnea experts.
- Extraction is perceived by the patient and lay people to be irreversible treatment whereas non-extraction ortho is not percieved as potentially harmful.
- The broad arch SW appliance creates lots of expansion and room. Give it a chance for nine months be-fore extraction.
- You can always take out teeth later if necessary.

Be A General Practitioner; Treat The Easier Cases And Refer The Tough Ones.

- Wisdom in general dentistry is knowing when to treat and when to refer.
- There is no worse feeling than to take an orthodontic case home mentally with you every night.
- It is very acceptable to be the referring GP, using the orthodontic specialist when needed.
- You do not want or need to treat every case that enters your office.
- A good relationship and friendship with a specialist is a must…and you get to stay in the fruit of the month club too!

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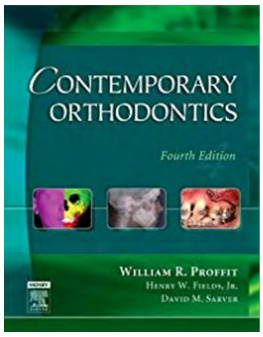
An Interesting Admission:

Contemporary Orthodontics
Fourth Edition
Excerpt from Page 164;

"The complexity of the treatment that would be required [for orthodontics] *affects treatment planning especially in the context of who should do the treatment. In orthodontics as in all areas of dentistry, it makes sense that the less complex cases would be selected for treatment in general or family practice, while the more complex cases would be referred to a specialist. The only difference in orthodontics is that traditionally the family practitioner has referred a larger number of orthodontic cases.*

In family practice, an important issue is how you rationally select patients for treatment or referral."



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Williams
Basic Straight Wire Series

Basic Course

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A Straight Wire Series

SWS refers to the arch wires used throughout an orthodontic case;

- the types of metal alloy those arch wires are made
- the sizes and shapes used
- the sequence in which those wires are placed.

When it comes to straight wire orthodontics, the wire is not the star of the show. It is all about the bracket!

The Bracket is programmed, it has a Rx – fill up the bracket slot with wire – and….

Straight teeth!!

- 1st(In/Out), 2nd(Tip), 3rd (Torque) order tooth movements are programmed into the bracket slot (Rx)
- Archwire (AW) series begins with light, flexible round wires…
- Progresses through a series of larger round wires…
- Increases to rectangular wires…
- Finishes in a large rectangular archwire – 3rd order

Wire Materials

In the Williams SWS, just two alloys:

- **Nitinol (NiTi)–** memory and flexibility
- **Stainless Steel (SS)–** still the mainstream wire, slippery, bendable and strong

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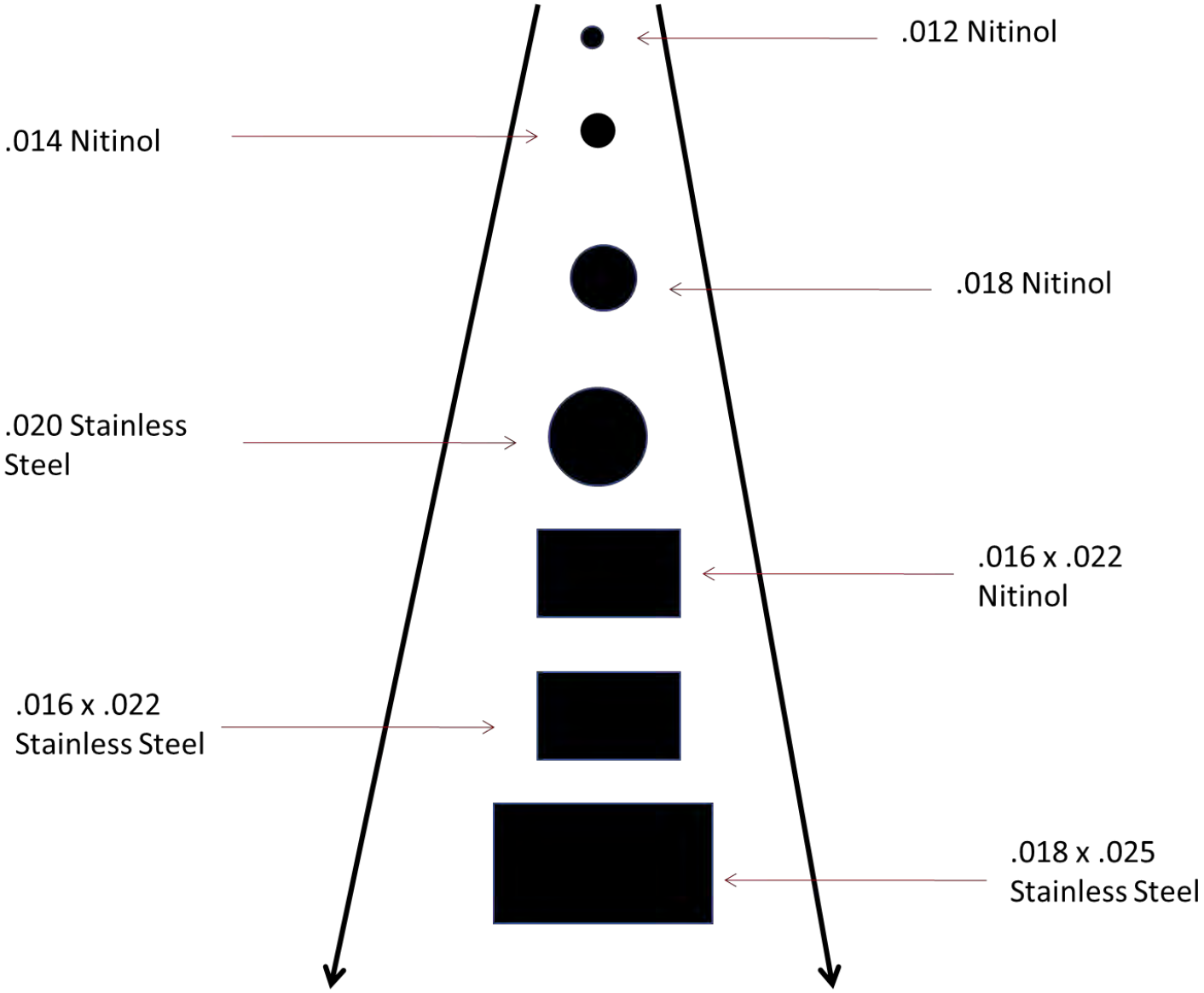
WILLIAMS BASIC STRAIGHT WIRE SERIES



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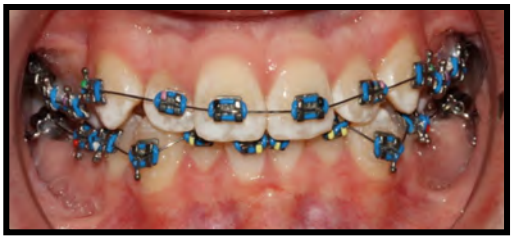
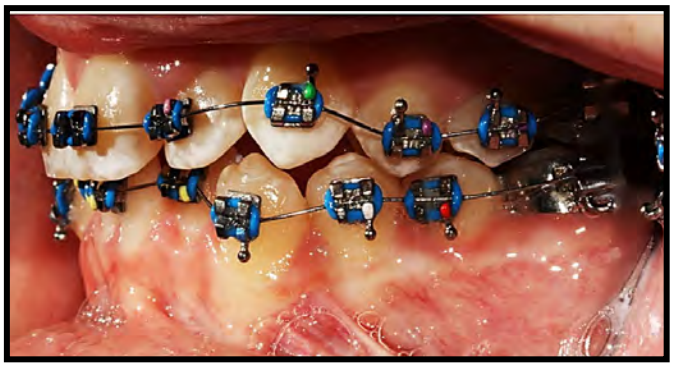
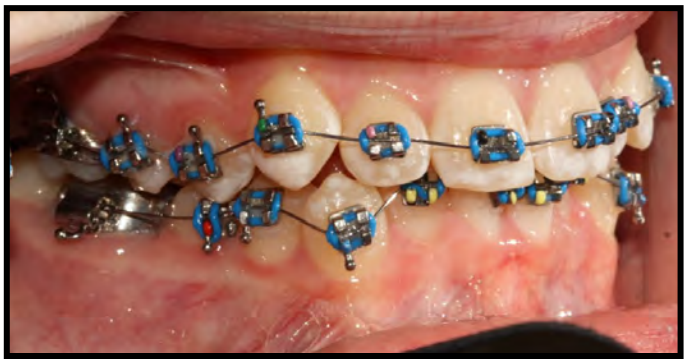
Williams SWS: Step-by-Step and Wire-by-Wire

.012 Nitinol

- Light wire
- Low force
- Acquaints patient to orthodontics
- No post-op pain
- Gets the periodontal ligaments stirred up
- Placed at initial bracketing appointment
- Can be used to rotate teeth

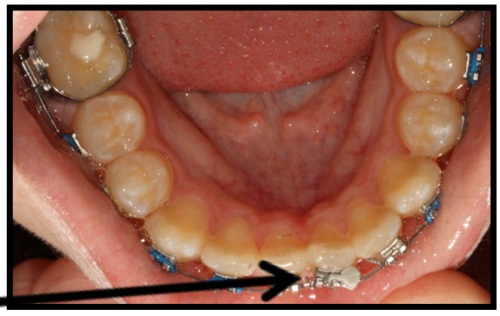






.014 Nitinol

- Placed after the .012/NT has been in 1-4 weeks
- Slightly heavier force
- Still very light, low pain
- Placed when 2nd molars are banded
- Rotation Wedges are ideal with this wire
- Remains until rotations are gone



Rotation wedges

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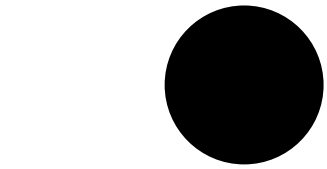
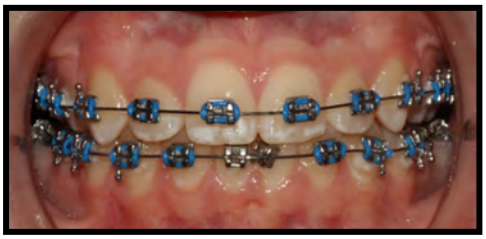
.018 Nitinol

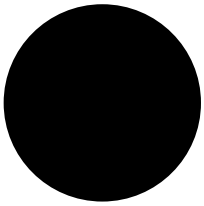
- Placed after the .014/NT wire when rotations are out
- Twice as much force as the .014
- Great wire to figure 8 with glide ties
- Arch begins to really develop
- 1st and 2nd order moments of force begin
- Remains 1-2 months
- Great wire to return to after re-bracketing teeth





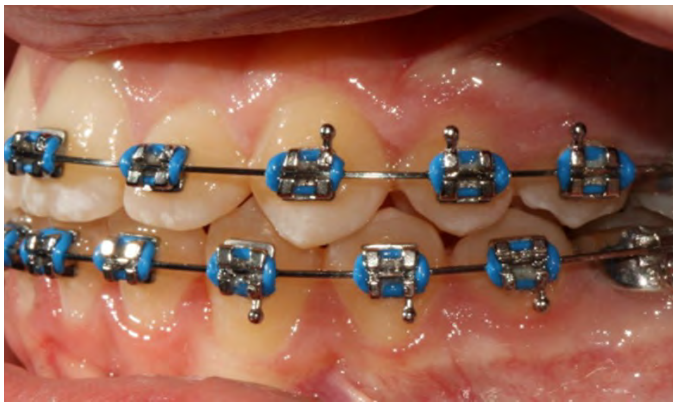
.020 Stainless Steel

- Placed after the .018/NT wire
- First SS archwire
- Open bites with Accentuated/Reverse Curves (AC/RC) placed in the wire
- Open space with Open Coil Spring (OCS) - Nitinol
- Hold space with passive OCS or rubber tubing
- Correct cross bites with step-in/step-out bends
- Remains until you have accomplished what you wanted to do with the wire.



.016 x .022 Nitinol

- First rectangular archwire
- Also a great wire to place after re-bracketing teeth
- Lines up the molars
- Usually left in for 4-6 weeks



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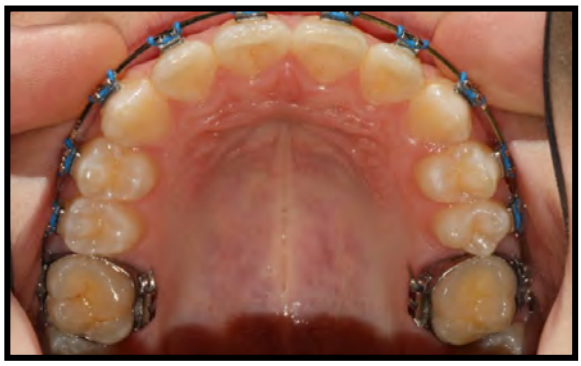
.016 x .022 Stainless Steel

- Continues to develop arch
- Great wire for AC/RC
- Elastic wear is started in SS rectangular wires
- Power Chain (PC) is started in SS rectangular wires
- Great wire for retraction of premolars in a Class II dentition after removal of an MDA
- Great wire for 2nd order bends
- Remains 1-3 months or until it has done what you want it to do



.018 x .025 Stainless Steel

- Finishing wire
- Final development of arch
- Maximum 3rd order moments of force
- Left in for 3 months for periodontal ligaments to tighten
- Sectionals are made from this wire

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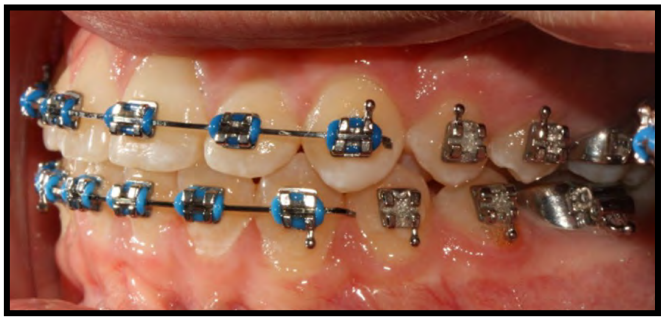
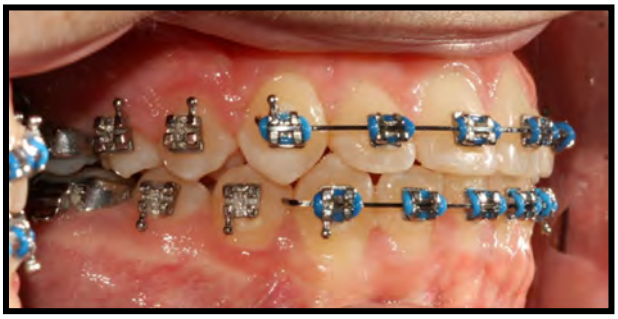
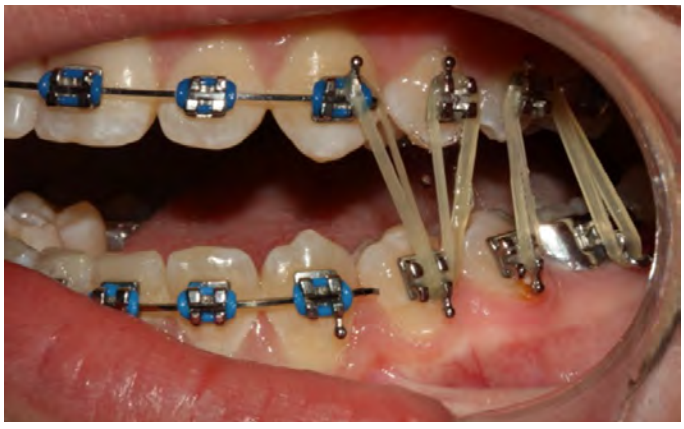
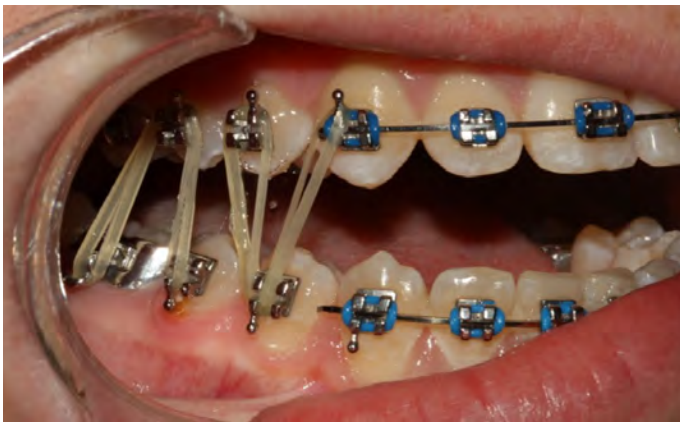
.018 x .025 Stainless Steel Sectionals

- Placed from cuspid to cuspid on both arches
- Cross-arch elastics are worn to:
    - Sock-in premolars
    - Attain buccal root torque on premolars
    - “V’s/TeePees” 3-4-4/5-5-6 (begin at upper 3)
    - Wear 4-6 weeks









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Remove Posterior Bands/Brackets (B/B)

- Remove posterior bands & brackets (all 4s-7s)
- Remove sectional archwires
- Leave brackets on 3-3 for both arches
- Impress for retainers
- Replace sectionals
- Leave on until retainer returns from the lab

Final Records/Deliver Retainers

- Remove anterior brackets
- Take all final x-rays and study models
- Deliver upper retainer (QCM acrylic retainer)
- Sometimes a upper bonded lingual is needed due to a diastema or incisor rotations/lapping, using .010 x .022 Bond-a-Braid wire.
- Deliver/Make lower bonded retainer, using .010 x .022 Bond-a-braid wire

Case Complete

- Check in two weeks to tighten retainer
- Check every 6 months at cleaning appointments

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Another Option...

Strip Case Final Records/Deliver Retainers

- Remove all brackets and bands
- Take all final x-rays and study models
- Sometimes a upper bonded lingual is needed due to a diastema or incisor rotations/lapping, using .010 x .022 Bond-a-Braid wire.
- Deliver upper vacuum form
- Deliver/Make lower bonded retainer (.010 x .022 Bond-a-braid wire)
- May serve as interim retainer until lab fabricated retainer is delivered

Case Complete

- Check in two weeks to tighten retainer
- Check every 6 months at cleaning appointments

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Mirror Photography

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Mirror Photography

Initial Records

Facial Pictures are taken in front of a blue/gray screen

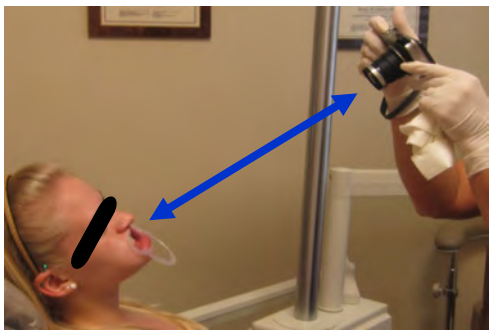
- Frontal Facial – No smile
- Frontal Facial – NATURAL smile
- Profile–Teeth together, lips closed, occlusal plane level
- Cheek retractor
- Regular bite
- End-on-end
- Upper Occlusal
- Lower Occlusal
- Left-side bite
- Right-side bite

Facial Pictures

Profile No Smile Smile

Cheek Retractor Pictures

- Use appropriate size retractor to fully expose teeth and gums
- Do not get too close to take the picture about 10-14 inches is ideal
- Patient should be able to fully bite down comfortably WITH their lips rolled out
- Should be able to see the first molar hooks on both sides
- Patient should pull their tongue back – don't want their tongue peeking through the occlusion
- Picture should be taken at teeth level otherwise patient will appear to have an overbite/overjet
- If patient is wearing anterior elastics, take this picture last (this will save time, so patient is not taking off or putting on elastics multiple times)



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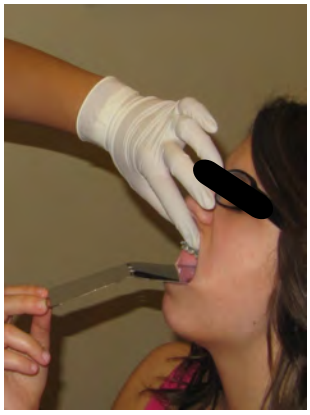
Upper Occlusal

- Patient should open as wide as possible
- Patient needs to relax cheeks/lips
- Insert mirror side-to-side, one corner at a time
- Rest mirror completely on lower arch
- Make sure all upper teeth are seen, including LAST molars
- Hold upper lip back to expose anterior teeth at the canines, without gloves/fingers covering the teeth
- Use retractors instead of fingers for better retraction
- Do NOT cut off anterior brackets
- Ask patient to relax their tongue
- Chin up for more light, if there are issues focusing
- Lower patient chair, if necessary



Lower Occlusal

- Raise the chair up, if needed (this will save your back)
- Patient should open as wide as possible
- Patient needs to relax cheeks/lips
- Insert mirror side-to-side, one corner at a time
- Rest edge of mirror distal of last lower molars and on the upper anteriors
- Make sure all lower teeth are seen, including any erupting molars
- Hold lower lip back to expose anterior teeth at the canines, without gloves/fingers covering the teeth
- Use retractors instead of fingers for better retraction
- Do NOT cut off anterior brackets
- Ask patient to pull their tongue back (behind mirror if possible)
- Chin up / nose in the air

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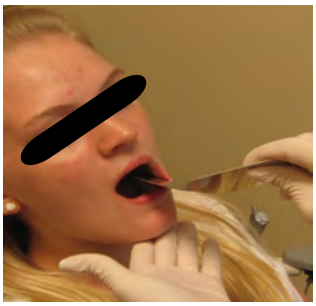
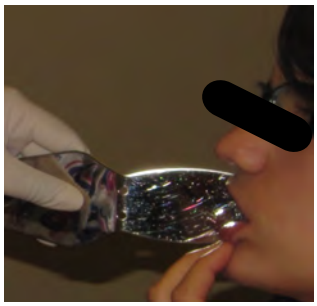
Buccal - Left / Right Side

- Have patient open wide to insert the mirror at an ANGLE
- Position mirror in the vestibule as far back as possible
- Make sure you are NOT resting on the jawbone
- Ask patient to relax cheeks/lips, this will make it more comfortable
- Pull the most distal part of the mirror outward
- Swing the anterior part of the mirror outward as well, while maintaining the distal hold (if you release the distal hold during this picture, it will feel like the mirror is stabbing the jawbone)
- Ask patient to bite down on their back teeth and pull their tongue back

NOTE: These are the most uncomfortable pictures for the patient

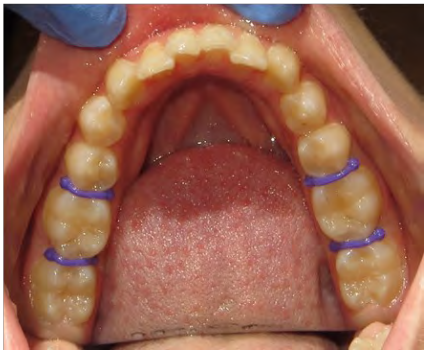




Initial Records

Separators Placed

End-on-End

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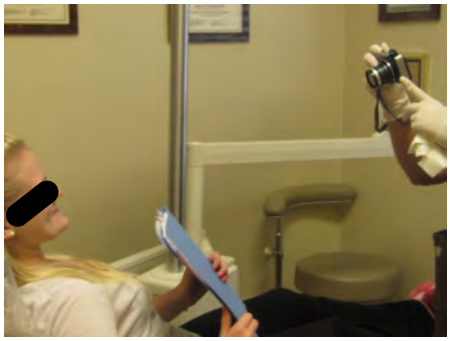
Appointment Pictures

- In Chair, Identification only
  - Frontal Facial
  - NATURAL smile
  - Profile
- Cheek retractor
  - Regular bite
- Upper Occlusal
- Lower Occlusal
- Left-side bite
- Right-side bite



Final Records

Facial Pictures are taken in front of a blue/gray screen

- Frontal Facial – No smile
- Frontal Facial – NATURAL smile
- Profile Teeth together, lips closed, occlusal plane level
- Cheek retractor - 2x (with & without retainer)
  - Regular bite
- Upper Occlusal – 2x (with & without retainer)
- Lower Occlusal - 2x (with & without retainer)
- Left-side bite - 2x (with & without retainer)
- Right-side bite – 2x (with & without retainer)

Final Records - Retainer Pictures

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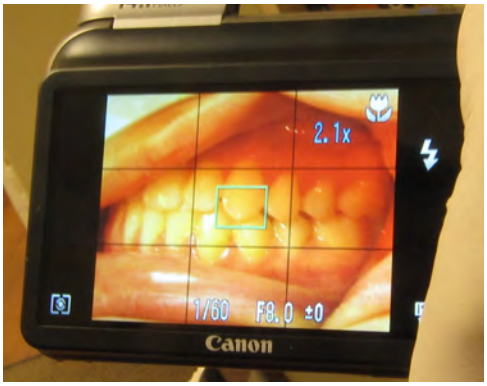
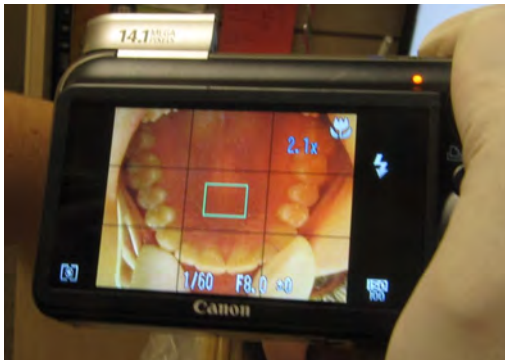
Let's Look at What You Will See





Photography Pearls

- Be consistent with the order in which you take photos
- It will save time for whomever is "loading" all the pictures for the day. Consistency is the key.
- Make sure you have a solid background on initial/final facial pictures
- Make sure you can see the patient's ear and eyelash on the profile picture
- No glasses or hats on - take them off
- Do not use the dental chair light for any pictures
- Cheek retractors will go in the mouth more easily when they are wet
- To take quality photos, your positioning must be as comfortable as possible for YOU
- Be careful not to hit brackets when placing the mirrors in the mouth. This will scratch the mirrors or knock off a bracket, not to mention, startle the patient
- Always pay attention to the angle of your mirrors and camera. You do not want the patient to APPEAR to have an overbite/overjet or open bite
- Your mirrors should always be parallel to the teeth AS WELL AS the camera parallel to the mirrors
- Place mirrors in an alginate bowl with warm water to prevent fogging

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General Camera Settings

Mirror Photography
Quick Reference Instructions

Using: Clinipix Cannon PowerShots

PATIENT PHOTOS

- Dial MUST stay on AV for all photos
- Flash ON for ALL pictures
- Must have the FLOWER ON (Macro) for ALL pictures
  (Press left side of dial to select)
- Facial Photos: F-Stop at 5.6
  (Move dial in a circular motion to change)
- Intraoral Photos: F-Stop at 8.0
  (Move dial in a circular motion to change)

DO NOT CHANGE ANYTHING ELSE !!!

ORDER OF PICTURES

- Front Facial - Smiling, in chair
- Profile Facial - No smile, in chair
- Cheek Retractors - Biting down, Intraoral
- Upper Occlusal, Intraoral
- Lower Occlusal, Intraoral
- Patient's LEFT side Intraoral
- Patient's RIGHT side Intraoral

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Equipment You May Need For Orthodontics

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Equipment You May Need

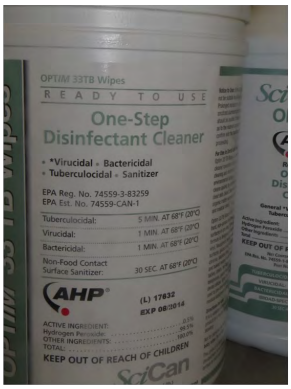
Sterilization & Laboratory

Dry Heat

- All instruments must be bone dry then placed on the tray
- Pouches are not needed
- Make sure all instruments are in the "open" position
- Double check your temperature to know what setting your sterilizer should be on
- Allow at least 40 minutes for sterilization

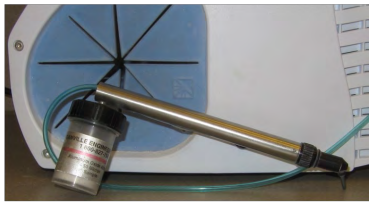
Sprays & Wipes

- Use after each patient on the orthodontic instruments
- Photography mirrors are sterilized with the spray
- Let both set for 3-5 minutes
- Any contaminates other than saliva, use dry heat sterilization, otherwise this is sufficient for the day, then dry heat sterilize



Micro Etcher for Re-bracketing

- This is used for cleaning brackets and bands for re-use (for the same patient)
- When brackets come off or need repositioning, use the same bracket
- Micro etch the base of the bracket only, not the facial – it will dull the bracket and not look good
- Micro etch the inside of the bands only when needing to clean the cement off



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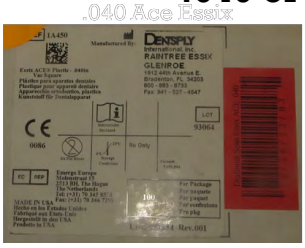
Vacuum-Form Retainers

.040 or .060

.040 Ace Essix



Torch

This is used for heat treating the ends of NITINOL wires to bend them so the bends will stay

Also, for heat treating FRLAs for retention in Phase I cases so there will be no expansion

Storage - Cabinets or Carts

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Banding & Bracketing a Patient

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Banding & Bracketing a Patient

Tray Set-up

- Cotton Rolls
- Gauze
- Scotch Tape
- Chap Stick
- Bands
- Brackets
- Curing Light
- Band & Bracket Cement
- Spatula
- Band Seater/Bite Stick
- Heavy Band Pusher
- Bracket Height Gauge
- Deluxe Bracket Placer/Slot Aligner
- Explorer
- Mirror

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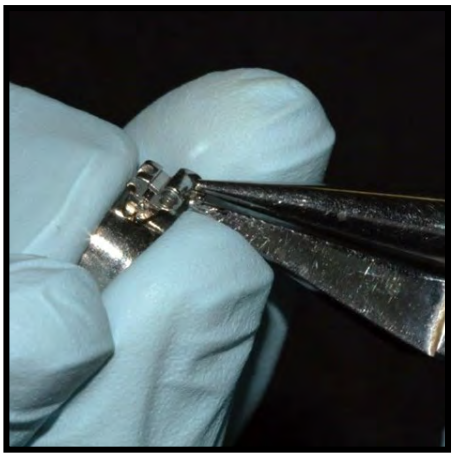
Sizing the Bands– Start in the middle range sizes when selecting a band.

Work up or down from there.

Use the mouth mirror to view from the occlusal.



Preparing the Bands– Bend the gingival hooks buccally.

Bend the lingual hooks flat against the band.

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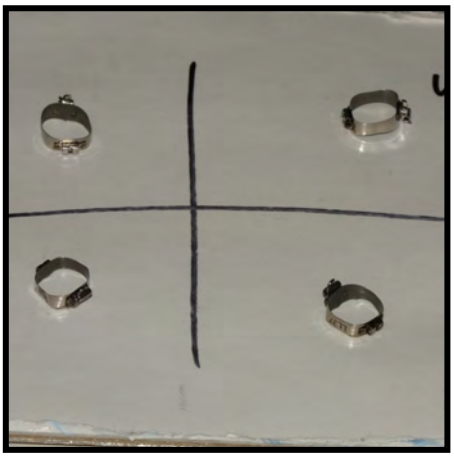
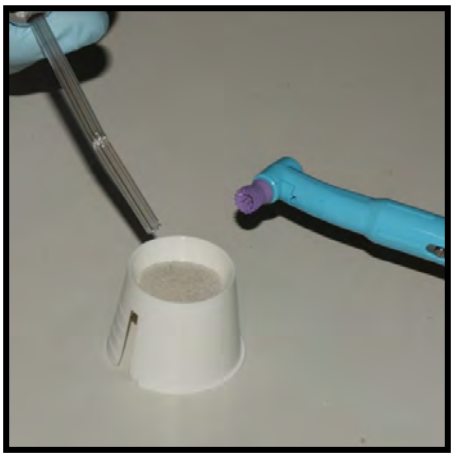
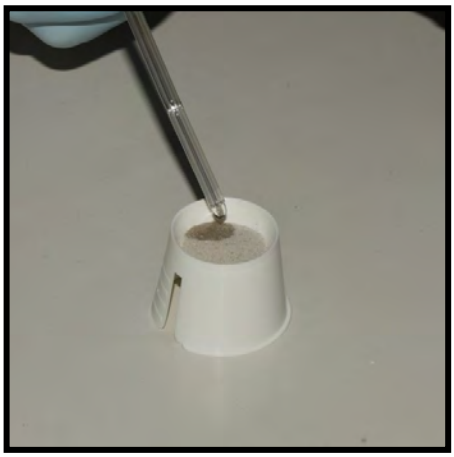


Bands placed on the mixing pad.





Preparing The Teeth– Clean w/non-fluoridated pumice.

Pumice molars and all buccal sufaces. Rinse thoroughly.

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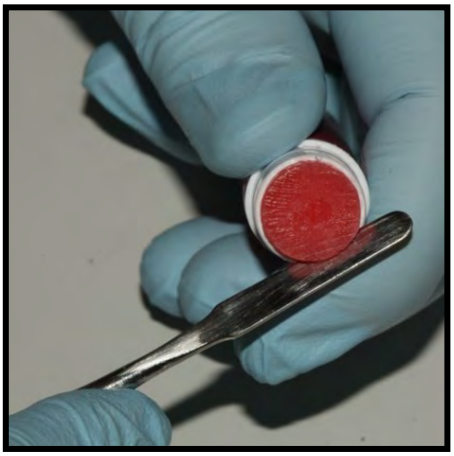
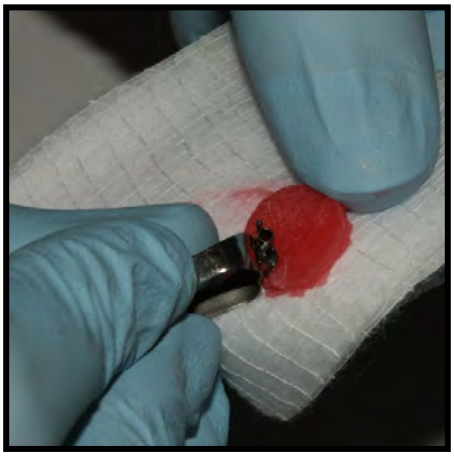
Cementing the Bands– Use a fluoride releasing cement such as a GIC.

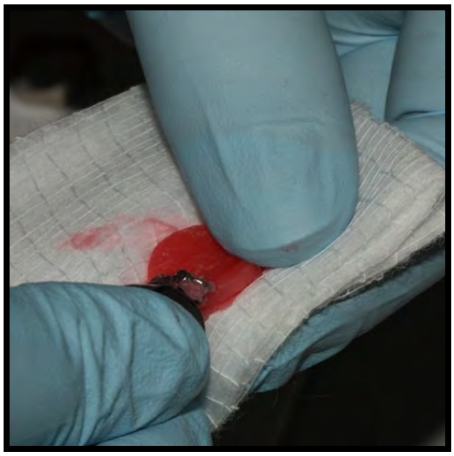
I prefer dual cure due to lack of light penetration dependability.

Preparing the Bands for Cementation. Block out the buccal tubes and lingual sheaths with chap stick .

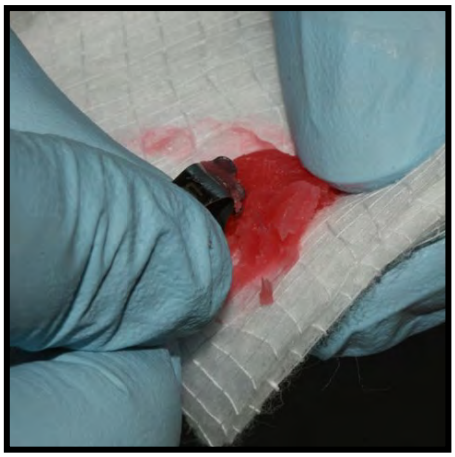


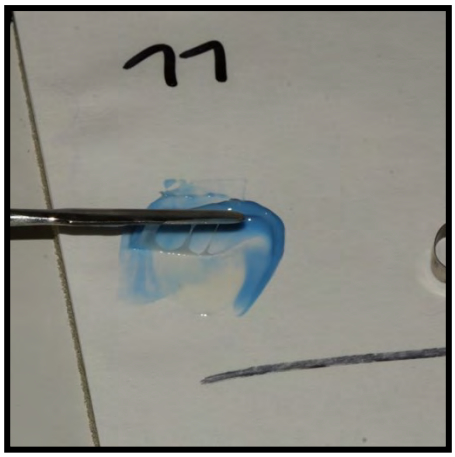
Do not use Vaseline.





Make sure to fill the lumens to avoid getting cement in them.





Scotch tape placed over the occlusal makes it easier to apply cement evenly in the internal surface of the band.

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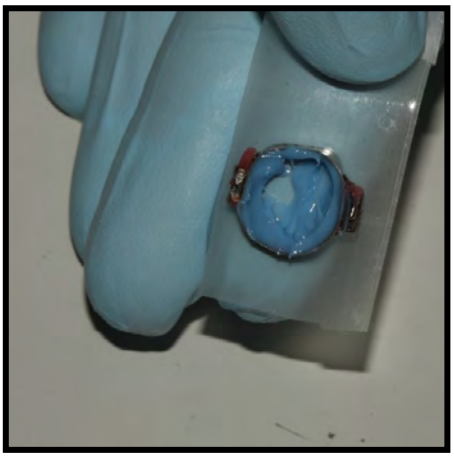
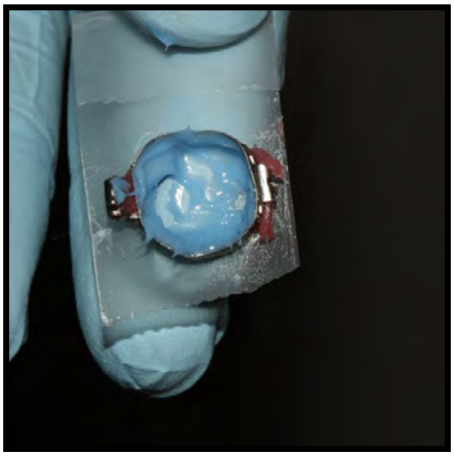
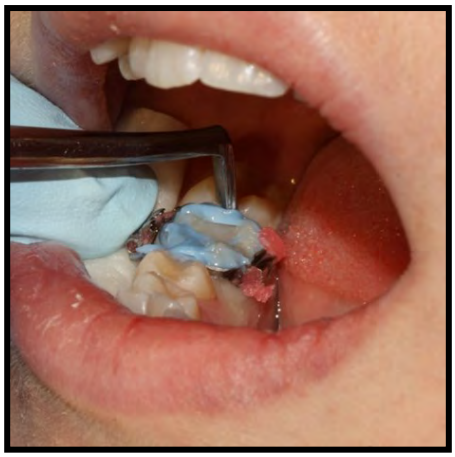


Seating the Bands– Dry the tooth. Place the band over the tooth with Scotch tape still on the occlusal.

Seat with firm finger pressure. Remove tape. Continue seating w/ band seater and bite stick.



Try to seat with equal amount of cusp showing above the band on the buccal and lingual.Seat far enough on the tooth so that the band is just at or below the marginal ridges mesial & distal.



Use band seater buccal lingual mesial distal.

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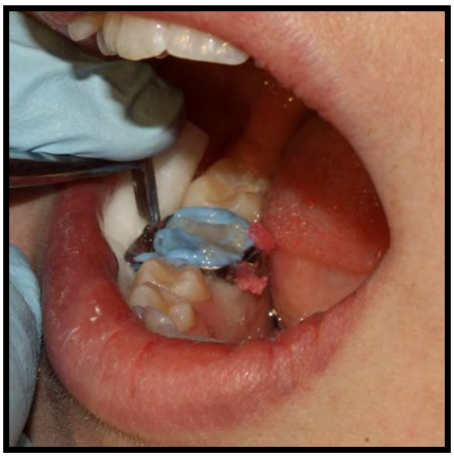
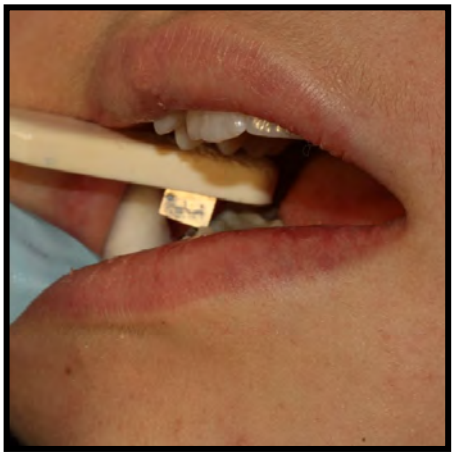


Use cotton rolls to remove excess cement.

Excess cement may be washed gently during seating before light curing.

Bite stick may be used if more seating pressure is required.



Light cure.

Clean remaining cement w/scaler.

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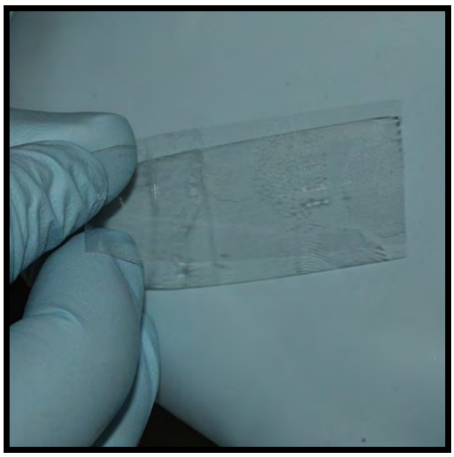


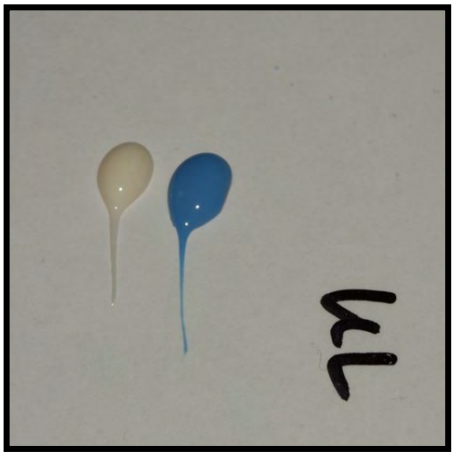

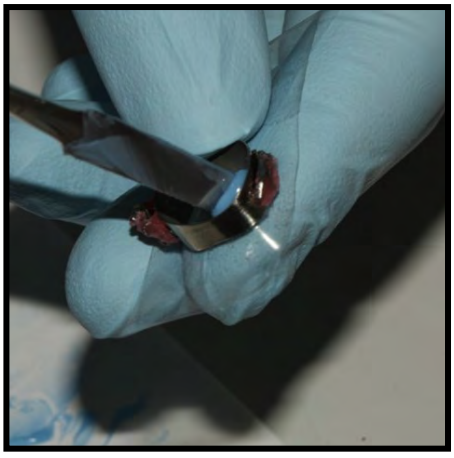
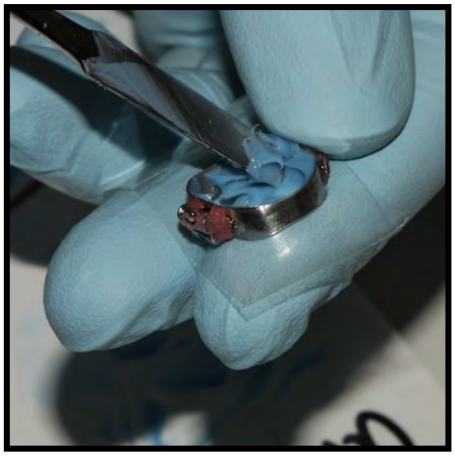


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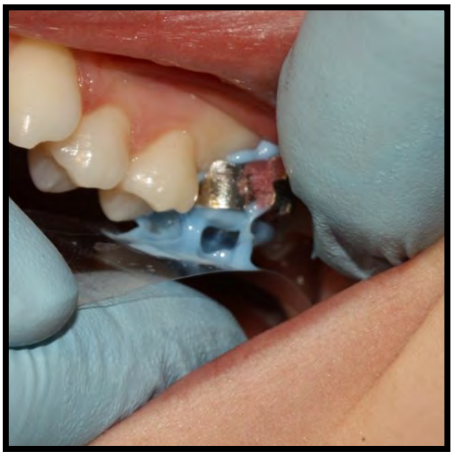




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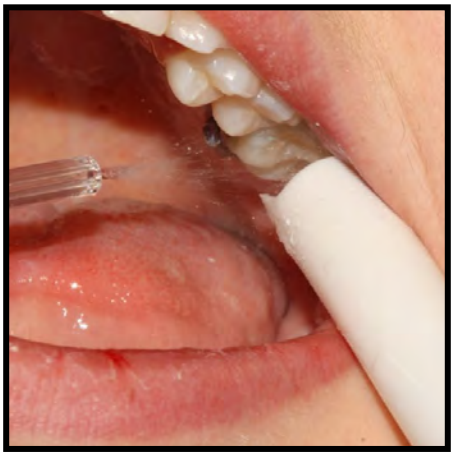


Place lip retractor.



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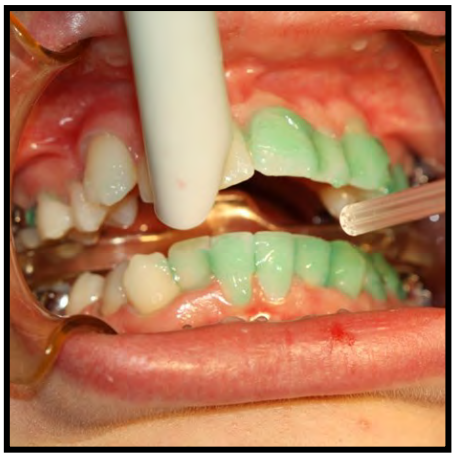
Rinse and apply etchant.

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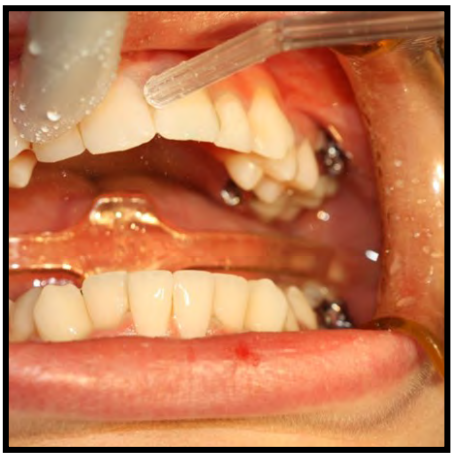
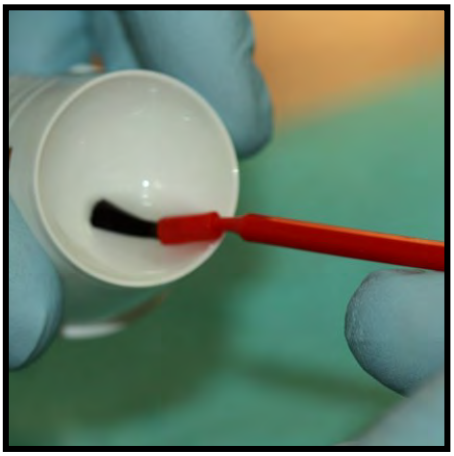
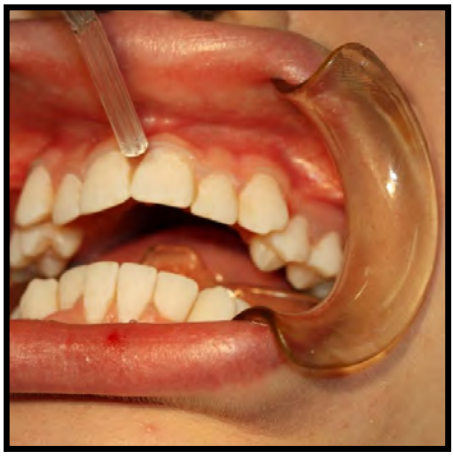


Rinse thoroughly for at least 1 minute.

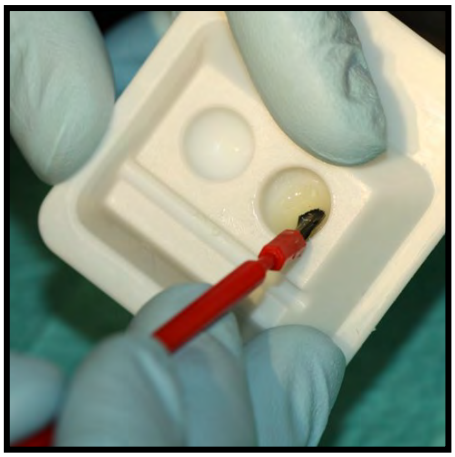
Vacuum and air dry.



Apply alcohol or a drying agent.



Dry thoroughly.



Apply bonding agent.

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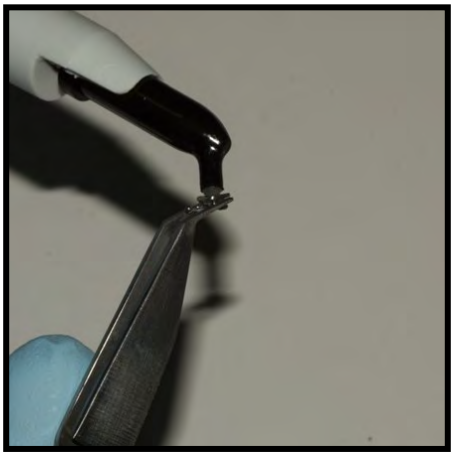
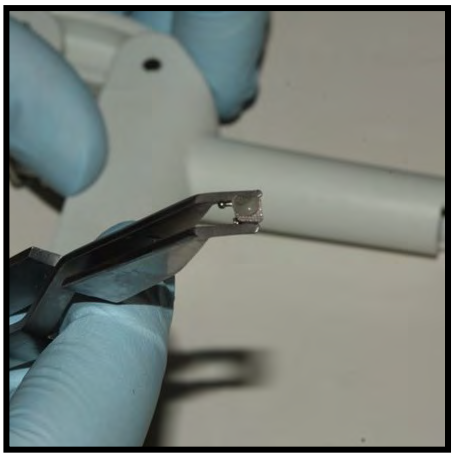
Apply bonding agent evenly.

Vacuum any excess, avoid getting bonding agent in the interproximal areas.

Light cure.



Place a very small amount of adhesive on the bracket pad.



Try to get paste over the entire mesh pad.

Place lightly on tooth surface.

I prefer to place lower posteriors first.

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Easier to control saliva.

Check height with a Boone or a Swivel head gauge. Light cure to tac in place.

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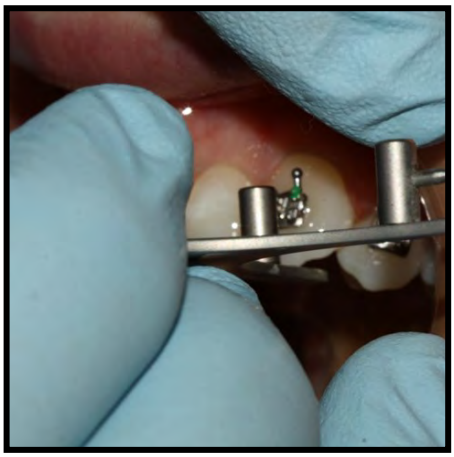




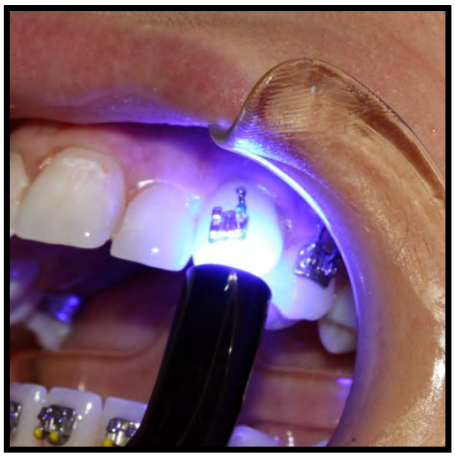


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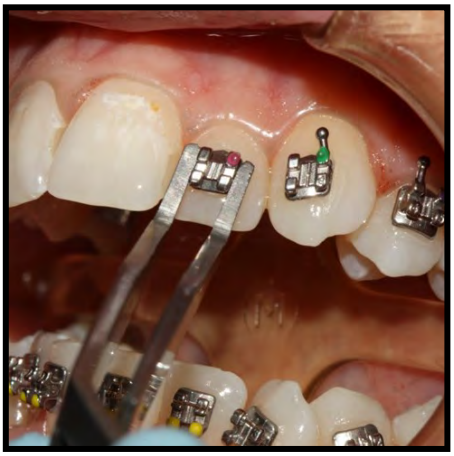




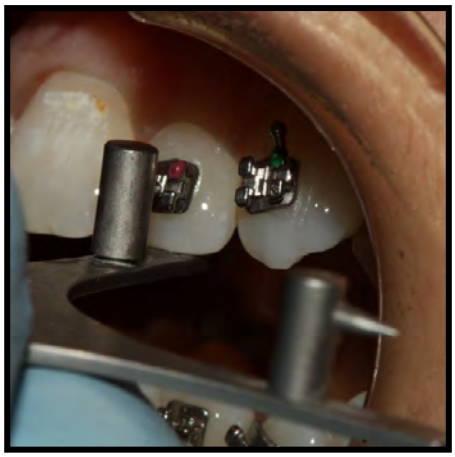

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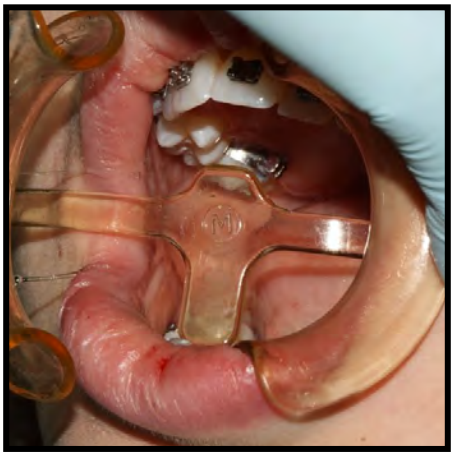
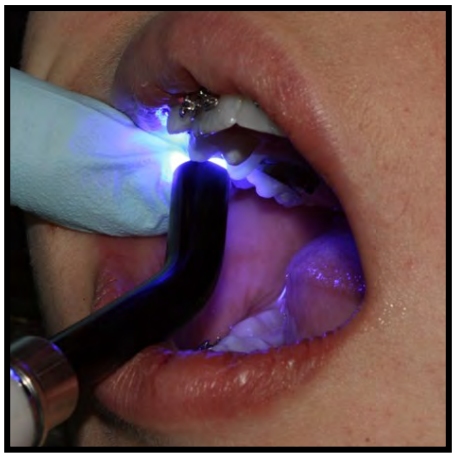


Remove retractor.

Then do thorough light cure of each bracket from the lingual, incisal, gingival, mesial and distal.



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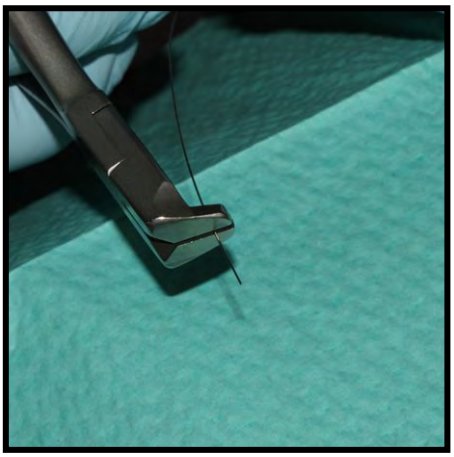
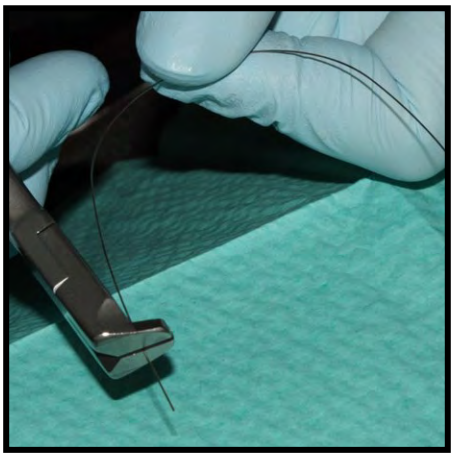
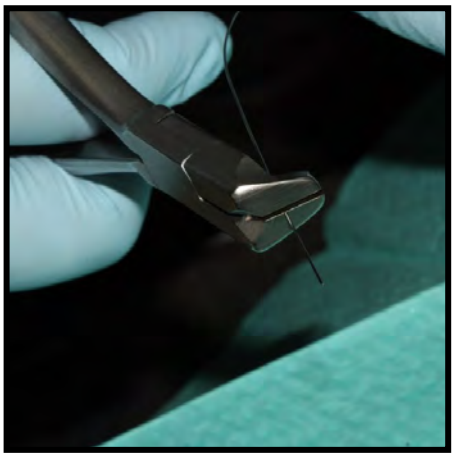

Placing the Initial Arch Wire– Remove some of the distal leg.

Place into the molar buccal tubes.

Position in brackets.

Cut any excess wire that may be sticking the patient using a distal wire cutter that cuts and holds.



Tie in with glide ties.

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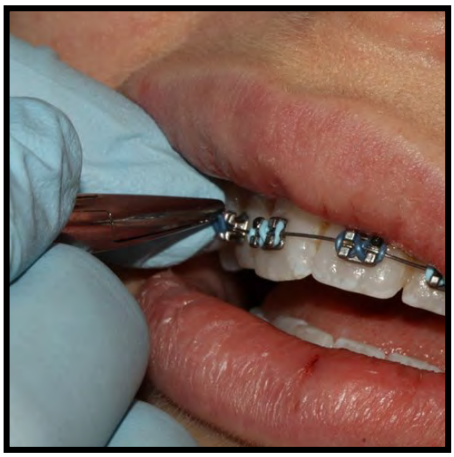




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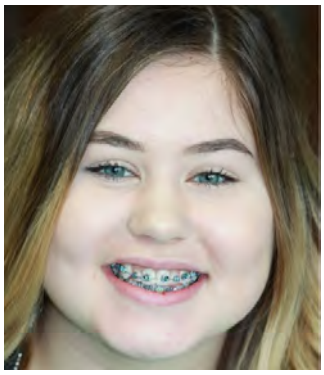

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Standard of Care Records

Basic Course

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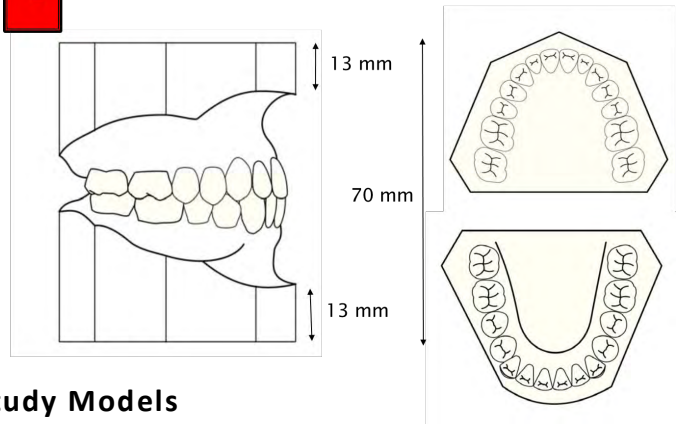
Standard of Care Records

- The records and stuff you need to properly diagnose, treatment plan and/or refer a case, and CYA!
- In order to make a decision about whether to treat or refer, a diagnosis required.
- And in order to make a diagnosis, you must have a data base.
- **ORTHODONTIC RECORDS FILL THE DATABASE**

Records

- It is imperative quality records are taken by the practitioner.
- Records which we deem acceptable in general dentistry may not be in orthodontics.
- The following records are considered "Standard of Care" in orthodontics:
    1. Quality Orthodontic Study Models
    2. Quality Cephalograph
    3. Quality Panolipse or FMX
    4. Quality seven series or bitewings
    5. Quality Photos (8-9)

1 Proper Study Models



Impressions for Study Models

Study Models

- GOOD impressions yield GOOD models
- Polished models are best for presentation

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Centric Occlusion Wax Bite

- No coverage on anterior teeth, you must see the patient fully bite down
- Place wax at or distal of the upper cuspids
- Wax bite or blue bite

Most labs today are requiring blue bite arch forms instead of wax. Wax can deform or even melt in transit.

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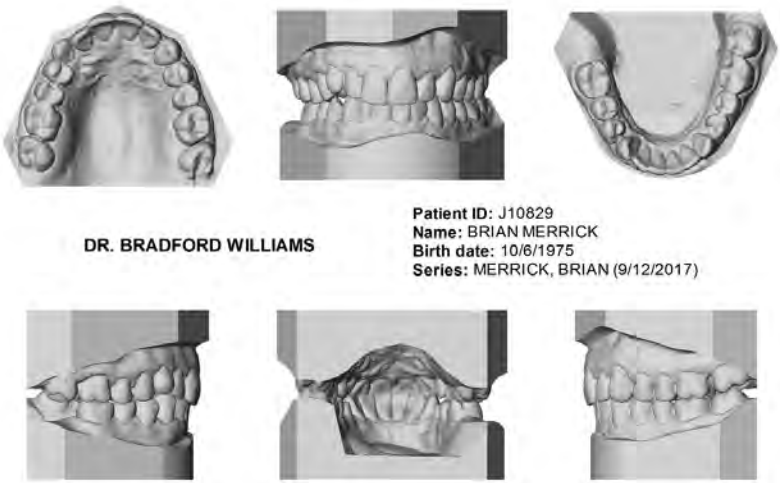
Digital Models

- ICAT

Johns Dental Lab



2 LATERAL CEPHALOGRAM

CEPH –Level to Horizon

GOOD

BAD

- No jewelry – ask if they have a tongue ring or hair extensions – these have metal in them)
- Teeth MUST be touching, but not clenched
- Lips MUST be closed (relaxed, natural)
- Ear pegs must be at the upper most point in the ear canal (almost like you could lift the patient off the floor)
- After processing the ceph, you must be able to see all the soft tissue in the profile (forehead, nose, lips, chin)
- If you do not take your own Cephs, you will still need to verify the radiograph is of good quality so the doctor can trace and diagnose the case accurately.

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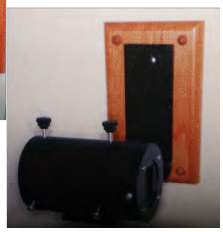
DUOCEPH



Hard to find new, but often available used on E-bay and can be installed by local free lance dental repair people.

You will need a phosphor plate scanner as well. This will allow you to convert the x-ray to digital. These can be acquired on E-bay as well.

3 PANORAMIC RADIOGRAPH

PAN or FMX

- Taken at Consultation – check time frame
- No jewelry – yes, ask if they have a tongue ring or hair extensions – these have metal in them.
- Flat Occlusal Plane
- Do not cut off the chin bone
- No Frowns or Smiles

GOOD

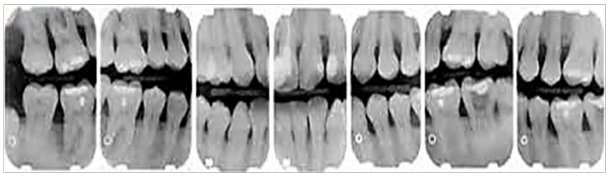
PAN

FROWN

BAD

SMILE

4 QUALITY SEVEN SERIES OR BITEWINGS



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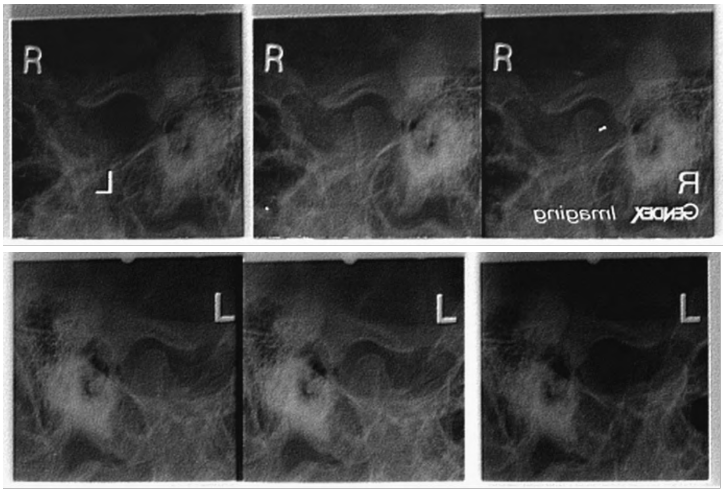
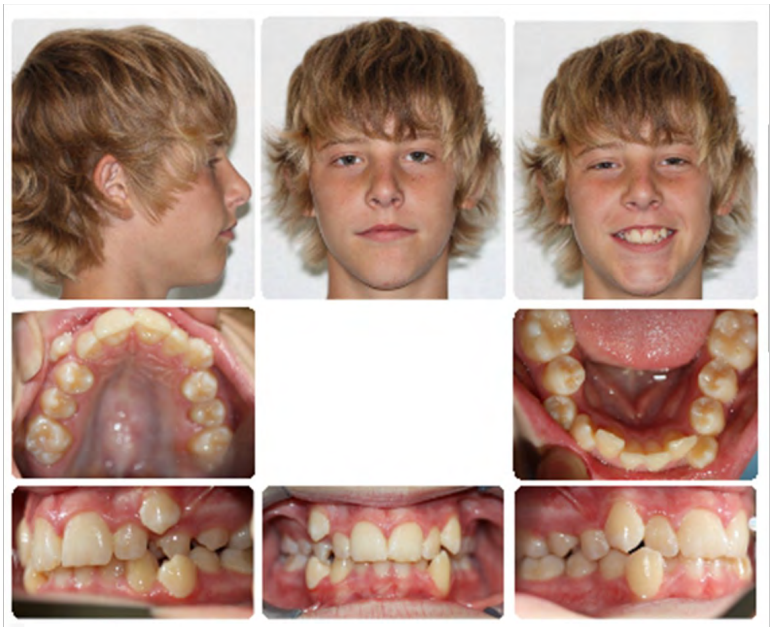
Other Radiographs

- 7-Series or Bitewings
  - Standard of care
- Transcranial
  - Not Standard of Care
  - For treating or following TMD or TMJ
  - CYA



TMJ transcranial radiographs

5 QUALITY CLINICAL PHOTOGRAPHS



Suggested Additional Records:

- Quality Transcranial Radiograph or Tomogram of TMJ
- TMJ Examination
- Airway evaluation (Tonsils and Adenoids)

AOS DIPLOMATE BOARD CASES

Must Submit 10 Cases…

- 1 – Class III
- 4 – Class II
- 5 – Doctor's Choice

Forms necessary to have within your patient record:

- Traced Cephalogram with an analysis
- Diagnosis
- Treatment Plan
- Consent and Information Forms (Signed)
- Signed Financial Arrangements
  - Ideally these records are taken initially, mid-treatment, and post-treatment.
  - We are judged according to the records we take.
  - Good records lead to thorough diagnosis and treatment planning, and in turn to good orthodontic care.

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NOTE:

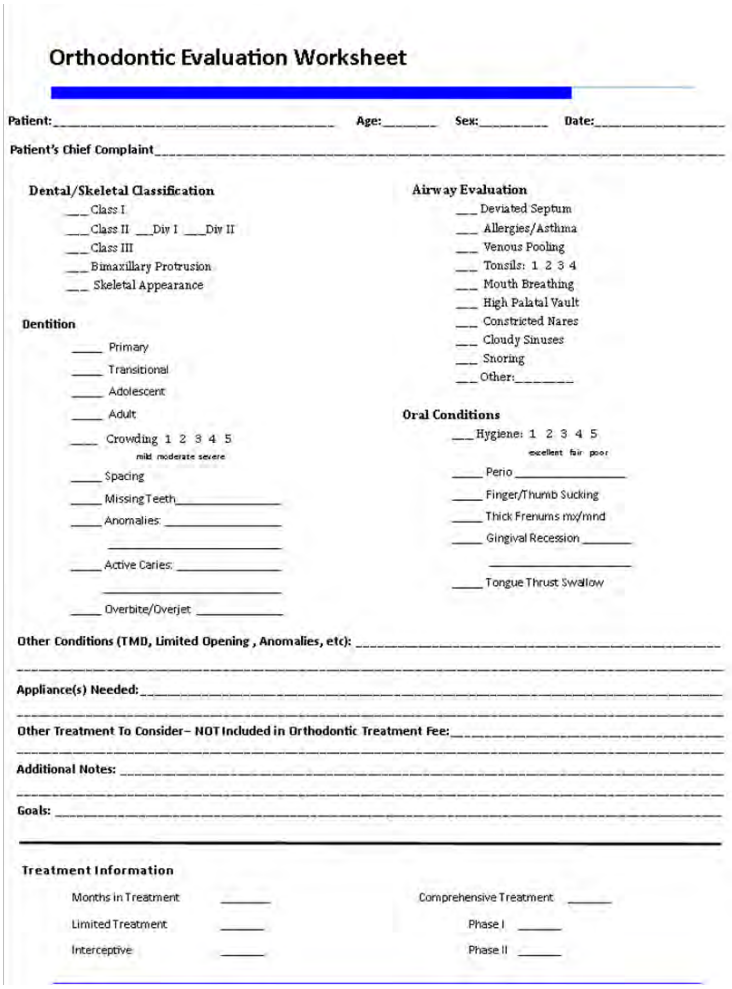
- All of the suggestions above will cover you legally and professionally.
- The records you take and keep are a reflection of you and your office.
- Take good records. You will never be sorry you did.
- If you ever want to pursue credentialing (such as fellowship/diplomate in the AOS) start good records now!!
- They will keep you safe.

Orthodontic Consultation & Initial Records

Free Orthodontic Consultation

- New patient? Then follow your office procedures (new patient forms, medical history, etc….)
- Need a current PANOGRAPH for doctor review (Dr. Williams' criteria is within 6 months or had any major dental work done)
- Fill out Orthodontic Evaluation Form
- Exam Setup:
    - Orthodontic Evaluation Form
    - Mirror
    - Explorer
    - Anything else the doctor wants for examination (floss for midline and profile exam, ruler for overjet, etc)

Orthodontic Evaluation Worksheet



Orthodontic Evaluation Worksheet

Patient:_____ Age:_____ Sex:_____ Date:_____

Patient's Chief Complaint_____

Dental/Skeletal Classification

___Class I
___Class II ___Div I ___Div II
___Class III
___Bimaxillary Protrusion
___ Skeletal Appearance

Dentition

____ Primary
____ Transitional
____ Adolescent
____ Adult
____ Crowding 1 2 3 4 5
mild moderate severe
____ Spacing
____ Missing Teeth_____
____ Anomalies: _____
_____
____ Active Caries: _____
_____
____ Overbite/Overjet _____

Airway Evaluation

___ Deviated Septum
___ Allergies/Asthma
___ Venous Pooling
___ Tonsils: 1 2 3 4
___ Mouth Breathing
___ High Palatal Vault
___ Constricted Nares
___ Cloudy Sinuses
___ Snoring
___ Other:_____

Oral Conditions

___Hygiene: 1 2 3 4 5
excellent fair poor
____ Perio _____
____ Finger/Thumb Sucking
____ Thick Frenums mx/mnd
____ Gingival Recession _____
_____
____ Tongue Thrust Swallow

Other Conditions (TMD, Limited Opening , Anomalies, etc): _____

_____

Appliance(s) Needed:_____

_____

Other Treatment To Consider– NOT Included in Orthodontic Treatment Fee:_____

_____

Additional Notes: _____

_____

Goals: _____

Treatment Information

Months in Treatment _____
Limited Treatment _____
Interceptive _____
Comprehensive Treatment _____
Phase I _____
Phase II _____

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Initial Records

- Standard of Care Radiographs
- Impressions for Study Models
- Centric Occlusion Wax Bite
- Chair-side Analysis
- TMJ Screening, if applicable
- Digital Photos – 9 Photos
- Orthodontic Flow Sheet

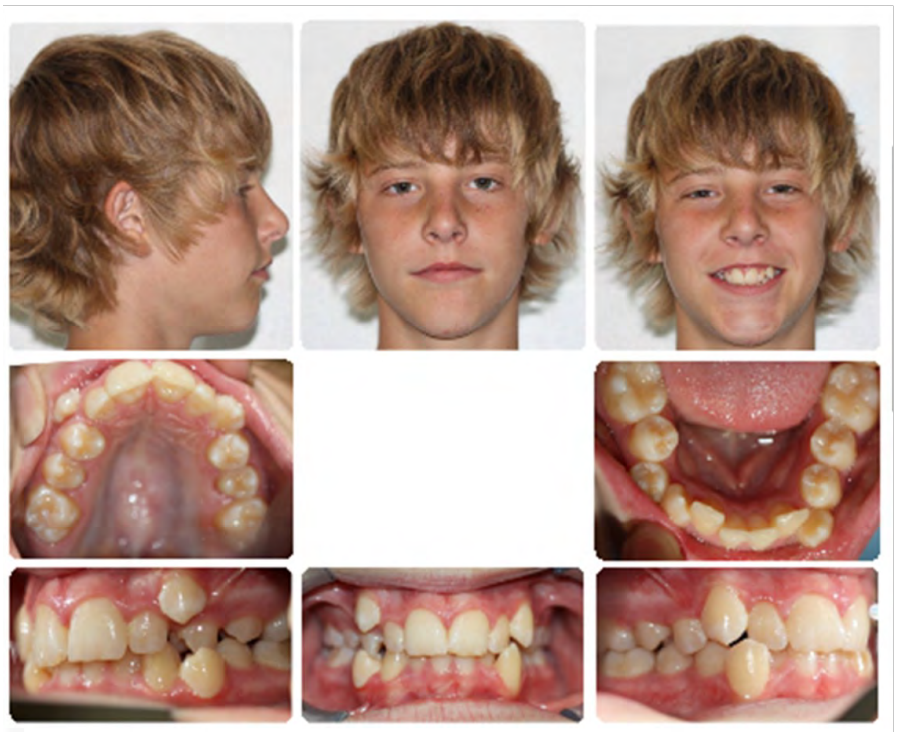
Chairside Analysis

You may elect to have your assistants make these observations prior to your first contact with the patient:

(Most doctors will want to do this themselves at the Consultation appointment)

- Review patient medical history
- Check tonsils (scale of 0-4)
- Verify if any allergies or sinus conditions
- Check midline with floss
- Measure maximum opening (upper incisal to lower incisal edge)
- Measure lateral movement – to both left and right sides
- Check for deflection/deviation when opening and closing
- Note any popping or clicking of TMJ (ask pt if there is any discomfort or locking of jaws)
- Anything else the doctor may want the assistant to look for.

Initial Records



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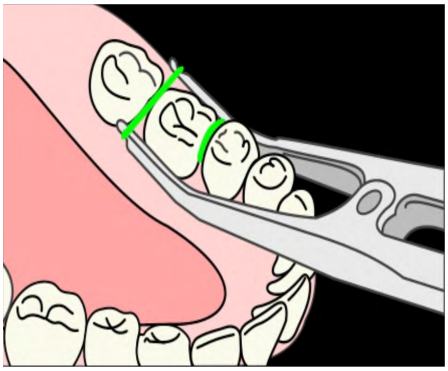
Starting Treatment

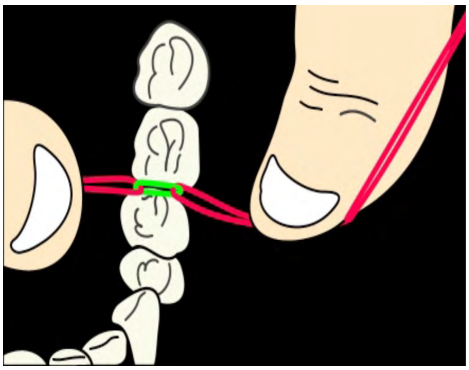
Most patients have agreed to start treatment immediately, which is why they are at the Initial Records appointment and have paid the Records Fee

- If this is the case, SEPARATORS should be placed at this appointment
  - Insurance may be filed when the bands are placed, not when the separators are placed
- Discuss instructions and care for separators
  - No flossing where separators are placed
  - No chewing gum
  - Banding appointment could be scheduled in 1-2 weeks depending on how tight the contacts are
- Take additional pictures (occlusal only) indicating placement of separators

Getting Started: Placing Separators

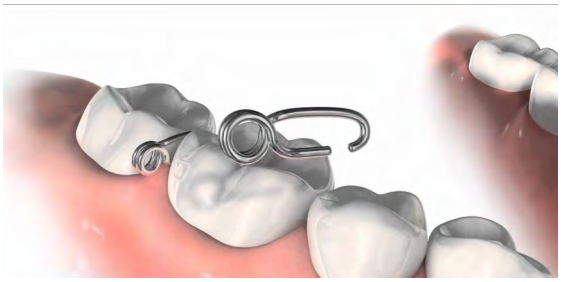


Placing a separator with a separator placement instrument.
A good trick is to lubricate the separator with topical.
It allows the separator to slide between the teeth and numbs at the same time to ease the slight discomfort created by this procedure.



Another way to place the separator is to thread two pieces of floss in the separator, and "floss" the separator into place.

Metal Separators– AN ALTERNATIVE TO ELASTICS



Separators Placed

Guidelines for Separators

- Separators should be placed about 48 hours prior to banding in children, ie: Phase I
- Should place at least 3 days in advance in adolescents
- Can take up to 5-7 days for patients with extremely tight contacts
- Band first molars at 1st appointment and place separators to band the second molars at the next appointment, if fully erupted

1st Molar Bands Seated

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Orthodontic Treatment Flow Sheet

Start Filling This Form Out At Consultation

Patient:_____ Age:_____ Date:_____

1st Contact– Phone/Office

Appointment # 1: Consultation (complimentary)

____ Consultation with Adult Patient/Minor Patient WITH Parent or Guardian with Doctor & TC
____ Complete Orthodontic Consultation Worksheet (give to doctor for tx planning after workup)
____ General Dental Tx Plan Generated PRN
____ Schedule Work-up (to decide to treat or refer)

Appointment #2: Diagnostic Work-up (Initial Records)

____ Chairside Analysis
____ Study Models
____ Panoramic Radiograph
____ Four Bitewings Radiographs
____ Diagnosis Worksheet (to be completed by doctor)
____Digital Photos (9)
____ Centric Occlusion Blue Bite
____ Cephalometric Radiograph
____ TMJ Screening (Pain or Popping)
____ Collect Records Fee
____ Schedule Case Presentation

Appointment #3: Case Presentation

____ Review Treatment Plan with Adult Patient/Parent or Guardian– treat or refer
____ Sign Contract & Consent Form
____ Schedule Band Spacer Appointment

Appointment # 4: Placement of Band Separators

____ Collect Total Amount of Ortho Fees Remaining
____ Placement of Separators for 1st Molar Bands

Appointment # 5: Band & Bracket

____ Impression for Appliance, if needed Type of Appliance Used: _____
____ Brackets Used (Manufacturer & Prescription):_____
____ 1st Molars Bands Used (Manufacturer & Size):_____ UR____ UL____ LR____ LL___
____ Initial Wire Placed: Size_____
____ Separators placed for 2nd molar bands, if present
____ OHI – Brushing Instructions
____ Ortho Care Package – New Patient Kit
____ Home Fluoride/Sonicare Dispensed

Appointment #6 Band 2nd Molars, if available

____ 2nd Molar Bands (Manufacturer & Size):_____ UR____ UL____ LR____ LL___

Completed Case: Final Records and Deliver Retainers

____ Chairside Analysis
____ Study Models
____ Panolipse Radiograph
____ Four Bitewings Radiographs
____ Upper Retainer Delivered
____ Fluoride Treatment
____ Digital Photos (9)
____ Centric Occlusion Blue Bite
____ Cephalometric Radiograph
____ TMJ Screening (Pain or Popping)
____ Bonded Lower 3x3 - Lower Retainer Delivered
____ Retainer & Post Care Instructions

Date Treatment Completed: _____

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Intro Diagnosis & Intro Treatment Planning

Basic Course

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Intro Diagnosis & Intro Treatment Planning

Beginning Diagnosis & Treatment Planning

- In Orthodontics, the diagnosis is the key to success.
- After gathering the necessary information to fill the database, determining the orthodontic classification in the majority of patients is not that hard.
- For the general dentist who is just beginning orthodontics, 70% of the patients that typically are encountered in practice fall into a category of relatively simple cases to diagnose and treatment plan.
- The remaining 30% will be much more difficult to diagnose and classify, therefore, should be referred to specialists until competency and confidence increase.

The Data Base

- Typically, these are the significant components of the Data Base:
- Clinical examination
- Panoramic radiograph
- Lateral Cephalometric radiograph
- Study Models
- Photographs

Clinical Examination

- The patient's Chief Complaint
- Facial esthetics and balance- asymmetry front and profile view, transverse and sagittal.
- Air way assessment- venous pooling under the eyes, nose or mouth breathing, "dry line" on teeth.
- Teeth and Jaws- caries, periodontal disease, TMJ, limited or deviated opening
- Mental, Emotional and Psychological- immature, irresponsible, uncooperative, mentally or psychologically impaired or compromised.

Panoramic Radiograph

- Cuspid and bicuspid apexification
- Dental age
- Third molars
- Congenitally missing/supernumerary teeth
- Impacted/blocked out teeth

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Lateral Cephalometric Analysis

- Chronological Age and Gender-predictor of growth
- Soft tissue profile
- Lower incisor to NB, Pogonion to NB, relationship Lower incisor to AP line
- Skeletal classifications
    - ANB: Skeletal class I, II or III pattern
    - Wits: Apical base Class I, II or III
    - SN-GoGn: neutral, closed or open bite growth pattern
    - Y-axis: (SN-SGn) neutral, counter clockwise & clockwise growth pattern

Study Models

- Dental classification I,II or III
- Curve of Spee
- Centric bite
- Andrews Six Keys of Occlusion

Photographs

- Facials
    - Frontal relaxed
    - Frontal smiling
    - Profile
- Intraoral
    - Frontal (optional frontal incisors end to end)
    - Left lateral and right lateral
    - Maxillary occlusal and mandibular occlusal

Intro Ceph Analysis

- Using the Williams Intro Analysis Forms gives an organized format to pull the diagnosis together, allowing a concise summary.
- Using this diagnosis, the treatment plan option corresponding to that case type is selected and is placed in the patient's chart along with the completed diagnostic analysis form.

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Williams *Intro* Cephalometric Analysis

Dental Classification (Class I, II, or III)

Molar Difference ____R____L 0 mm (+ = II; - = III)

Cuspid Difference ____R____L 0 mm (+ = II; - = III)

Check One: ____I ____II ____III

Cephalometric Analysis

Measurement	Value	Norm	Notes
SNA	_____	82° +/- 4	_____
SNB	_____	80° +/- 4	_____
ANB	_____	0 to 4°	_____
WITS mm	_____	–1 mm +/- 1	_____
SN-GoGn	_____	32° +/- 5	_____
Y axis (SN)	_____	67° +/- 3	_____
E-plane MX lip	_____	0 to +2mm	_____
E-plane MN lip	_____	0 to +2mm	_____

Skeletal Classification

ANB ____° 0 to 4° (> = II; < = III)

WITS ____mm 0 to -2 mm (> = II; < = III)

Check One: ____I ____II ____III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn ____° 32 ° +/- 5 ° (> =Clock; < = Counter)

Y Axis (SN) ____° 67 ° +/- 3 ° (> = Clock; < = Counter)

Balanced Face – Esthetic Profile

E Plane Mx Lip ____mm 1 mm +/- 1 mm (< = Concave; > = Convex)

E Plane Mn Lip ____mm 1 mm =/- 1 mm (< = Concave; > = Convex)

SUMMARY:

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Williams *Intro* Diagnosis Worksheet

Case #: _____ Patient: _____ Date: _____ DOB: _____

Age: _____yr _____mo Sex: _____ Responsible Party: _____

Address: _____ City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Referred By: _____

Ethnic Norm: _____ Dentition: _____ Treatment Stage: _____

Skeletal Classification

ANB	_____ °	0 to 4°	(> = II; < = III)
WITS	_____ mm	-1 +/-1 mm	(> = II; < = III)

Check One: ____ I ____ II ____III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn	_____ °	32 ° +/- 5 °	(> =Clock; < = Counter)
Y Axis (SN)	_____ °	67 ° +/- 3 °	(> = Clock; < = Counter)

Balanced Face – Esthetic Profile

E Plane Mx Lip	___ mm	1 mm +/- 1 mm	(< = Concave; > = Convex)
E Plane Mn Lip	___ mm	1 mm =/- 1 mm	(< = Concave; > = Convex)

Study Cast, Photos or Clinical Assessment

___Anterior Crowding	___Anterior Open Bite	___Class I	
___Anterior Crossbite	___Anterior Deep Bite	___Class II	
___Posterior Crowding	___Posterior Open Bite		Division 1: ____
___Posterior Crossbite	___Posterior Space Loss		Division 2: ____
___Rotated teeth	___Impacted Teeth	___Class III	
Curve of Spee:____	Smile Line:____		

Sim Analysis:

Arch width (difference between projected & actual)

Mx 3's: _____ Mx 6's: _____

Mn 3's _____ Mn 6's: _____

Arch Length Discrepancies mm: (total of 21-23 difference totals)

Mx Arch: _____ Mn Arch:_____

DIAGNOSIS _____

_____

_____

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Treatment Planning Overview

- Choose one of the 7 treatment plan options that fits the diagnosis. This treatment plan will allow the correction of the mixed dentition problem in early intervention cases, or it will allow the establishment of the lower arch in comprehensive cases.
- Once the lower arch needs are considered, the wire series is applied, working up through the .018x.025 stainless steel arch wire.
- Next, the upper arch is manipulated over the lower arch in such a way that the U6s mesial buccal cusps are positioned over the L6s buccal grooves and the upper first and second premolars are in the embrasures of the lower premolars.
- All the remaining spaces in the anterior segments are then closed, if any space has been created from the previous work.
- Cross arch elastics and sectionals are employed to "sock in" the premolars.
- Finally, the case is stripped and a Vacuum form, Begg, Hawley or QCM retainer is delivered as well as a lower bonded 3x3 retainer.
- Retention forever!

Phase I vs Phase II

Definitions

Phase I: Early orthodontic treatment in the primary or mixed dentition that will finish before all the primary teeth exfoliate and/or before the 28 permanent teeth arrive.

Phase II: Comprehensive orthodontic treatment in the mixed or permanent dentition that will finish with the permanent dentition arranged to reflect the Andrew's six keys to occlusion.

Note Regarding Phase I vs Phase II:

- Phase I can occasionally make Phase II unnecessary (but not often).
- A Phase I case, if started late or if it runs long, may overlap into Phase II treatment. (This needs to be anticipated and discussed, if possible, but regardless, the finances need to be addressed and handled as soon as possible to avoid confusion and conflict.)
- Often a case may not require an early start. In these situations, treatment would be Phase II only, even if the case starts in UAWs.

Establishment of the Lower Arch

The lower arch is always the diagnostic arch. Establishing the lower arch means anticipation of **LEVELING, ALIGNING, AND ROTATING** all teeth that are available in the lower arch, including second molars if possible. You must decide and determine based on the diagnostic observations of the lower arch, which includes the position of the lower incisors, premolars, and molars, what treatment plan is necessary to fit the maxillary teeth on the lower arch.

Depending on the age and stage of development, this may simply be a typical Phase I treatment which would involve:

1. Regaining space from early tooth loss, or holding the "E" space (In a mixed dentition and transverse/sagittal appliances if needed)
2. It might include early re-posturing of the mandible or bringing the maxilla forward.

To "establish the lower arch" may require a typical Phase II treatment in which the lower arch is established as the upper arch is developed, which would involve:

1. Bracketing the teeth and following an archwire sequence (Transverse Appliances, if needed)
2. An upper distalization appliance in conjunction with a straight wire series
3. A lower distalization appliance in conjunction with a straight wire series
4. A reposturing appliance in conjunction with a straight wire series

However, "establishing the lower arch" may require a more complex Phase II treatment in order to protect the lower incisor/pogonion complex, which would involve:

1. Pre-distalizing the lower arch
2. Extraction Mechanics (IPR occasionally)

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What do we mean when we say, "establish the lower arch, the lower arch is the diagnostic arch?"

- It means that all that data-gathering and diagnosis is aimed at helping the dentist in determining/deciding the position that all the lower teeth are to be and then treatment planning how to put them there and place the upper teeth on top of them.
- It doesn't mean that the lower arch has to be treated first or independently, but it does mean that the leveling, aligning and rotating of the lower teeth has to be considered first and foremost.
- So, when we consider doing any orthodontics on a given patient, we are deciding during the diagnostic stage where the lower incisors are as well as the rest of the lower teeth and the mandible, and we pick our treatment to establish that lower arch foundation.
- Of course, this allows the dentist to then choose a treatment path that will hopefully achieve Andrew's Six Keys to Occlusion, the ultimate goal.

Phase I

Occurs in Primary/Mixed Dentition

Definition:

Early orthodontic treatment in the primary or mixed dentition that will finish before all the primary teeth exfoliate and/or before the 28 permanent teeth arrive.

Phase I Treatment Plans

Scenario A

Place utility archwires and/or transverse/sagittal appliances, to recreate the "E" space, or simply hold the "E" space if adequate with a fixed removable lingual arch to utilize the "E" space. Evaluate patient for phase II every six months. Remove FRLA when permanent teeth erupt and begin Phase II, if needed.

Scenario B

Place larger utility archwires with bite jumping appliances, holding the "E" space, correcting the malocclusion as well as the jaw positions. Evaluate patient for Phase II every six months. Remove FRLA when permanent teeth erupt and begin Phase II, if needed.

Indications for Phase I Treatment (Scenario A or B)

- Mixed Dentition with transverse and/or sagittal issues
- Late Mixed Dentition with transverse and/or sagittal issues.
- Malposed anterior teeth and crowding
- Deep anterior bite
- Rotated molars
- Esthetic issues
- To minimize or alleviate the need for Phase II

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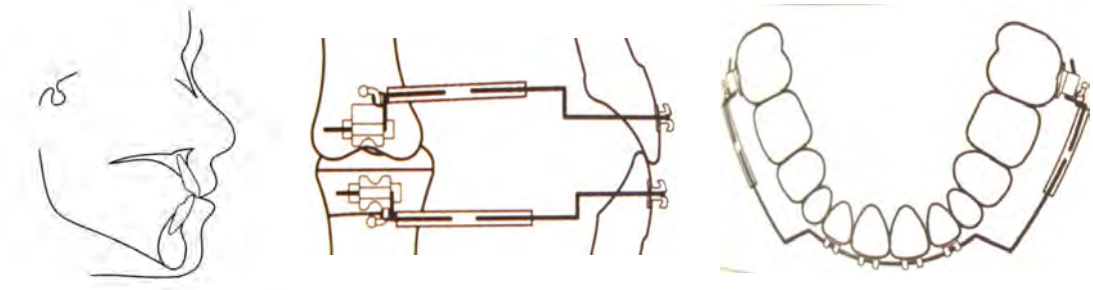
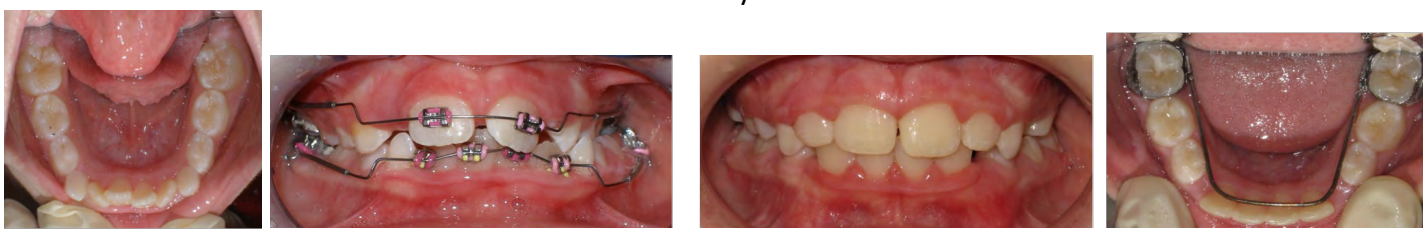
Diagrams of the UAW system used in a typical Phase I treatment.



Photographs of the UAW System

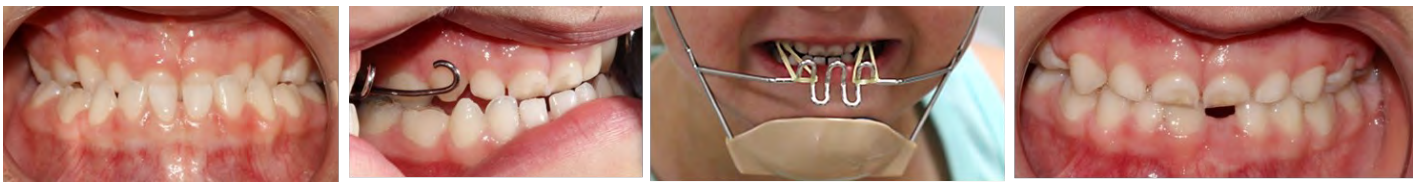
Phase I Scenario A Example Case: (Repositioning of the teeth)

- Mixed Dentition– with Utility Arch Wires & FRLA Retention



Phase I Scenario B Example Cases: (Repositioning of the dentures)

- Primary Dentition– RVFM, without UAWs*



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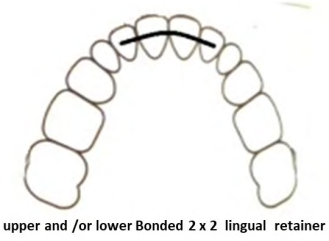
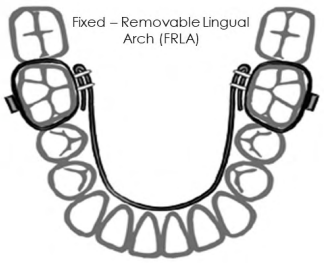
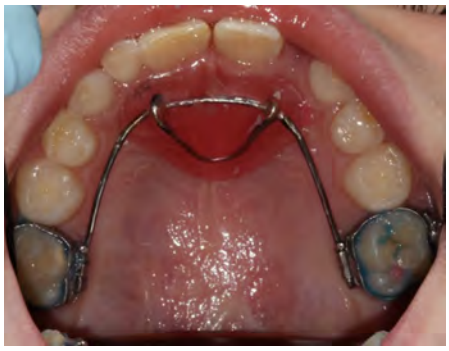
Post Phase I Retention– Applies to Both Scenarios



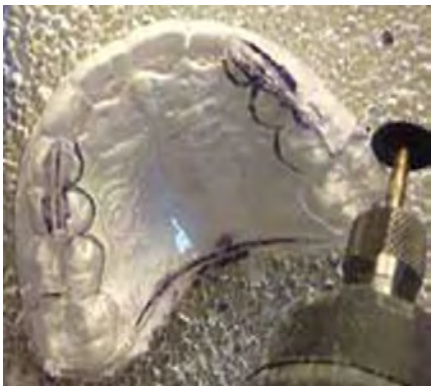


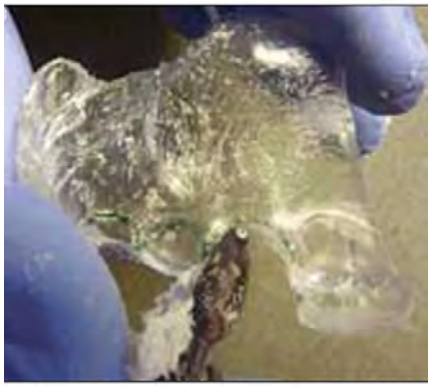
In-Office Nance Button Holding Arch



Lab-Fab Nance Button Holding Arch

The Modified Theroux Phase I Retainer





How it is made:

- Wheel saw used to cut material off cast.
- Acrylic bur used to trim appliance.
- Final appliance made from clear Splint Biocryl.

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Just as the Phase I treatment has two basic plans, two scenarios, so the Phase II treatment plans can be divided into two broad groups or scenarios as well.

Phase II:
Occurs in Late Mixed/Permanent Dentition

Definition:
Comprehensive therapy to arrange the teeth according to the Andrew's Six Keys to Occlusion

Indications for Phase II Treatment can be subdivided into two basic scenarios. These two situations divide the treatment plan options into categories; Scenario A & B:

Scenario A: (includes Williams Treatment Plans 1, 2 & 3)

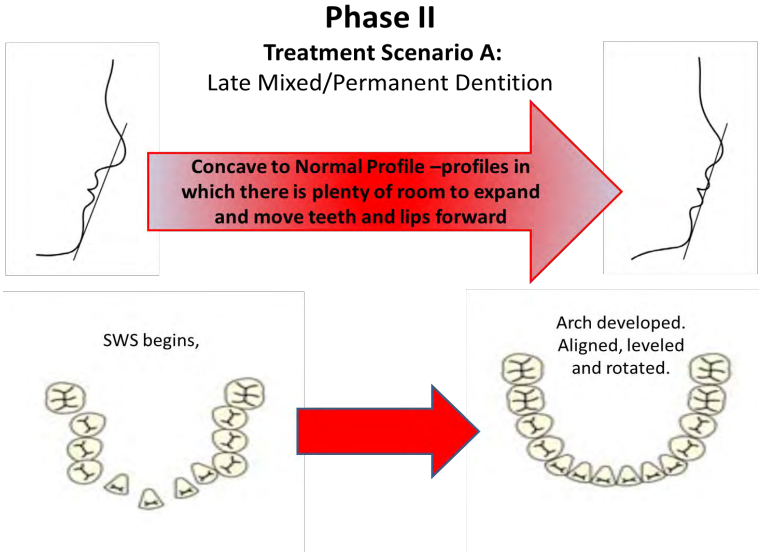
1. Concave to Normal Profile
2. Permanent or Late Mixed Dentition
3. Incisors can come forward
4. Mild to Moderate Crowding (possibly with transverse and/or slight sagittal issues)

Scenario B: (includes Williams Treatment Plans 4 & Extraction)

1. Full Profile (protrusion, bimaxillary protrusion, little/no pogonion and no potential for growth)
2. Mild to Moderate Crowding (possibly with transverse and/or slight sagittal issues)
3. Incisors cannot come forward
4. Permanent or Late Mixed Dentition

Phase II
Treatment Scenario A: Late Mixed/Permanent Dentition (This subdivision includes Williams Treatment Plans 1, 2 & 3)

1. Bracketing with straight wire sequence (Utility arch wires and/or straight wire series
2. Transverse/Sagittal Arch Developing Appliances if needed



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Phase II

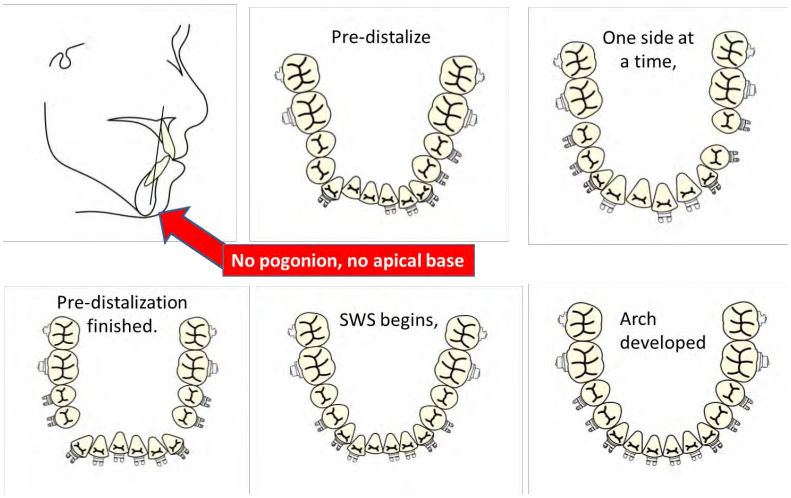
Treatment Scenario B: Late Mixed/Permanent Dentition (This subdivision includes Williams Treatment Plans 4 and Extraction)

1. Pre-Distalization or Extraction
2. Bracketing with straight wire sequence
3. Transverse Appliances if needed
4. Lower Distalization if needed
5. Upper Distalization if needed

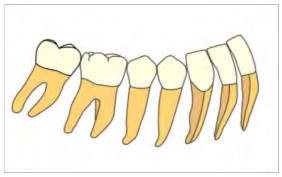
Indications for Phase II Treatment Scenario B:

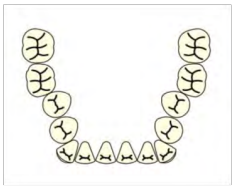
1. Full Profile (protrusion, bimaxillary protrusion, little/no pogonion and no potential for growth)
2. Mild to Moderate Crowding (possibly with transverse and/or slight sagittal issues)
3. Incisors cannot come forward
4. Permanent or Late Mixed Dentition

Full Profile

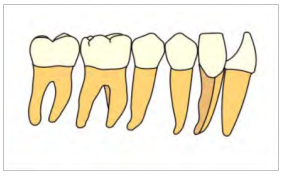


Establish the lower arch with a wire series (level, align, and rotate), progressing from a light round arch-wire until the brackets eventually accept an .018 x .025 stainless steel arch wire.


Deep Curve of Spee


Arch Constrictions/Rotations


Anterior Irregularities


Curve of Spee Leveled


Arch Aligned and Rotated


Anterior Teeth Leveled

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NOTE:

- Employing these methods to establish the lower arch obviously is closely tied into the esthetic plane as well as genetic ethnicity.
- In a concave or flat profile for example, one may decide to advance the anterior teeth to achieve more lip support.
- In some races, procumbency is norm, so finishing full is desired.
- Other races where a procumbent profile is undesirable, one would obviously distalize the posterior teeth for maximum esthetic effects.

Treatment Plans:

- After you have decided where to place the lower incisors and how to establish the lower arch, considering all these general options, you then must develop a full treatment plan and make it a permanent record in your patient's chart.
- The following are treatment plans. They are by no means the only options. They are a general rule of thumb which I follow in my office.

Mixed Dentition- Utility Archwires Phase I Treatment Plan:

- Full Standard of Care Records
- Sagittal/Transverse Appliances, if needed (Determined by the Sim Analysis)
- .018 NT Prefab. UAW (badly malposed teeth)……..1-2 months
- .016 x .016 NT Prefab UAW (Minor malposed)……..1-2 months
- .016 x .016 SS Prefab UAW (Tip - backs; Toe - ins; Advance)……..6 months
- FRLA ……..Until Phase II (Until premolars erupting)

Phase I UTW without Appliances Treatment A

- Just UTW

Phase I UTW with Appliances Treatment B

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Phase II

Comprehensive treatment plans that finish to Andrew's Six Keys of Occlusion in permanent dentition.

SWS Treatment Plan 1: Class I

When the lower incisors **can** be brought forward, if they **can't,** see Treatment Plan 4

- Full Standard of Care Records
- .012 (.014) Nitinol…….. 1 -2 months (Comp. Pads)
- .014 Nitinol (RW)…….1- 4 months or until rotations are out
- .018 Nitinol……1 month
- .020 Stainless Steel (AC/RC CB, if needed)……1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
- .016 x .022 Nitinol……1month (**Take Pan and rebracket any teeth if needed**)
- .016 x .022 Stainless Steel ……1 month
- .018 x .025 Stainless Steel ……3 months
- Cross arch elastics and sectionals……2wks – 1 month (Until premolars fully intercuspated)
- Remove posterior bands/brackets –impress for retainers …… 2wks – 1 month
- Remove sectionals – QCM/Bonded lower 3x3…….. 2 wks –1 month
- Check in one week, retention forever

NOTE: If it is a late mixed dentition, one may place prefabricated utility archwires until the premolar/canines erupt, and then bracket them, and follow the wire series above.

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SWS Treatment Plan 2: Class II

When the lower incisors **can** be brought forward, if they **can't,** see Treatment Plan 4

- Full Standard of Care Records
- .012 (.014) Nitinol…….. 1 month (Comp. Pads)
- .014 Nitinol (RW)……..1- 4 months or until rotations are out
- .018 Nitinol……1 month
- .020 Stainless Steel (AC/RC CB, if needed)……..1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
- .016 x .022 Nitinol……1month (**Take Pan and rebracket any teeth if needed**)
- .016 x .022 Stainless Steel ……1 month
- MDA/.018 x .025 Stainles……Until over distalized 6-8mm
- Retract Premolars on .016 x .022 Stainless Steel (AC-BRT)……2-3 months****

  (Until premolars fully intercuspated)
- Retract Canines on .016 x .022 Stainless Steel (AC-BRT)……2-3 months
- Retract Anterior Teeth with .018 x .025 posted SS (AC-BRT)……..2-3 months
- .018 x .025 Stainless Steel ……3 months
- Cross arch elastics and sectionals……2wks – 1 month (Until premolars fully intercuspated)
- Remove posterior bands/brackets –impress for retainers …… 2wks – 1 month
- Remove sectionals – QCM/Bonded lower 3x3…….. 2 wks –1 month
- Check in one week, retention forever

****Often after removal of the MDA, the teeth are not totally aligned. Therefore prior to placing the .016 x .022 SS immediately after removing the MDA, one must place .018 Niti for two weeks followed by .020 SS for two weeks, and then progress to the .016 x .022 SS.

NOTES ON TREATMENT PLAN 2:

- Other Distalization appliances (such as the Carrier Distalizer – Henry Schein) may be placed at the beginning of treatment to distalize the molars in lieu of the MDA – after distalization is attained, the straight wire series may be followed as in treatment plan 1.
- ALSO, If the Mandible is Retrognathic and the Maxilla Prognathic, one may opt to employ a straight wire series as in Treatment Plan 1, only then placing a .019 x .025 stainless steel archwire in both arches, bending the distal ends of the archwires distal to the second molars, placing a lower lingual arch, and placing as reposturing appliance (such as the Twin Force bite corrector – Henry Schein).

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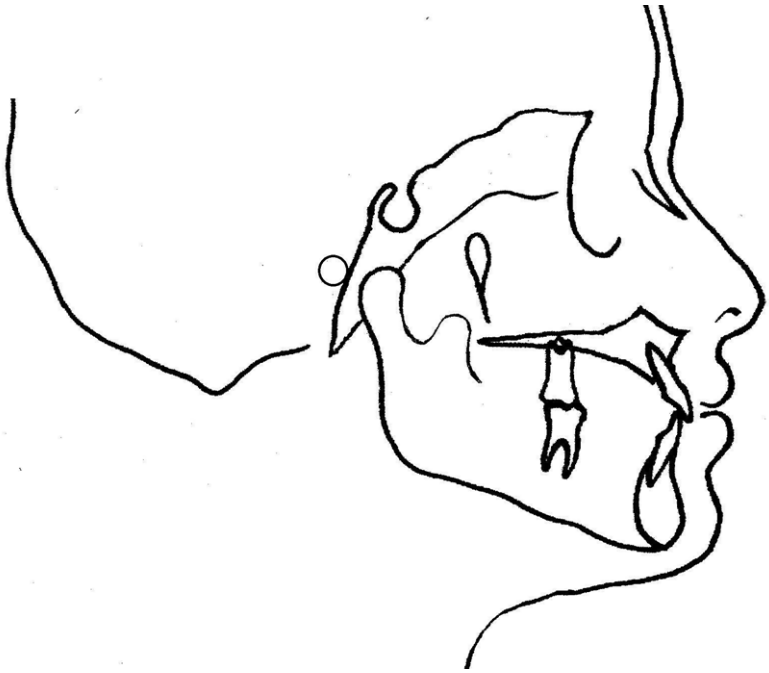
Williams Basic Analysis

Cephalometric Landmarks

Basic Course



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LATERAL CEPHALOGRAM- NOTES ON THIS ANALYSIS

- This Williams Basic Analysis has been pared down to only include the information that I typically look at in my general orthodontic practice.
- It dovetails perfectly into the Basic diagnosis and treatment planning I will be teaching in my Level I and II courses.
- This is by no means an in depth ceph analysis but rather a tool to be used to sort cases in diagnosis to determine whether to treat or refer.
- My intention is to lecture on more in depth ceph during the Intermediate course.

CEPHALOMETRIC ANALYSES

- There are too many cephalometric analyses to count. Over 800 are available through Dolphin alone. Downs, Steiner, Tweed, Ricketts, Wits, McNamara, Sim, Gerety, Jackson and this intro analysis are just the tip of the iceberg. A Ceph analysis is an absolute necessity in the orthodontic diagnosis process but it isn't the most important part of that data base. In the past, Cephalometry was the cornerstone to the orthodontic diagnoses; some orthodontists even advocated treating to the cephalometric norms.
- My Williams analyses for both Intro and Basic are now available in Dolphin.
- Today we know that many cases when finished will not have cephalometric measurements, which fit the norms. However, they may look great and be very stable.
- Today, our culture dictates that we treat according to esthetics and well-balanced faces. Most of the time, you will find that when you achieve good esthetics, the final cephalometric values will be within the normal ranges.
- The ceph analysis is standard of care diagnostic information and the practioner must have a working understanding of basic Ceph to properly diagnose and treatment plan cases.
- With this in mind, we will review basic anatomical landmarks, trace several head films as a group, diagnose, and treatment plan. This will be integrated into cases we present throughout these five sessions.

These are the books to add to your personal reference library in the order that I believe will be most beneficial:

- Orthodontics Current Principles and Techniques– Fourth Edition; Graber, Vanarsdall, Vig; Elsevier Mosby
- Contemporary Orthodontics Second Edition; William R. Proffitt Mosby Year Book
- Orthodontic and Dentofacial Orthopedics; James A. McNamara, Jr.; William L. Brudon Needham Press
- Orthodontic and Orthopedic Treatment in the Mixed Dentition; James A. McNamara, Jr.
- Radiographic Cephalometry, From Basics to Video– Imaging; Alexander Jacobson, DMD, MS, MDS, PhD - Quintessence Publishing Co, Inc

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CEPH ANALYSIS LANDMARKS FOR BASIC

Porion Highest point of the ear canal; most superior point of the external auditory meatus

Orbitale Lowest point of the roof of orbit; most inferior point of the external border of the orbital cavity.

Sella Center of the pituitary fossa of the sphenoid bone.

Nasion Intersection of the internasal suture with the fronto-nasal suture in the mid-sagittal plane.

ST Glabella Most anterior soft tissue profile on the frontal bone.

ST Nasion Soft tissue profile's most concave point at the bridge of the nose.

Bridge of Nose Mid-point from soft tissue Nasion to Tip of Nose; first contour encountered along the length of the profile of the nose.

Tip of Nose Pronasale. Point of the anterior curve of the nose.

Subnasale Point where the nose connects to center of upper lip.

ST A- Point Soft Tissue point A; most concave point between subnasale and the anterior point of the upper lip.

Upper Lip Most anterior point on the curve of the upper lip.

Stomion superious Most inferior point on the curve of the upper lip.

Stomion Inferious Most superior point on the curve of the lower lip.

Lower Lip Most anterior point on the curve of the lower lip.

ST B-Point Most concave point between the lower lip and the soft tissue chin.

ST Pogonion Point on the anterior curve of soft tissue chin.

ST Gnathion The midpoint between the most anterior and inferior points of the soft tissue chin in the mid-sagittal plane.

ST Menton The most inferior point of the soft tissue chin.

B Point Most posterior point in the concavity along the anterior border of the symphysis.

Pogonion Most anterior point on the mid-sagittal symphysis.

Gnathion The midpoint between the most anterior and inferior points of the symphysis in the mid-sagittal plane.

Menton Most inferior point of the symphysis.

D Point The center of the symphysis structure.

Gonion Most convex point where the posterior inferior curve of the ramus meet.

Ramus Point Most posterior point up the border of the ramus.

Mid Ramus (R1) Most concave point on the inferior of the ramus.

Articulare Posterior border of the neck of the condyle.

A Point Deepest point of the curve of the maxilla, between anterior nasal spine (ANS) and the dental alveolus.

ANS Tip of the anterior nasal spine.

PNS Tip of the posterior nasal spine.

U6 Occlusal Mesio-buccal cusp tip of the maxillary first molar.

L6 Occlusal Mesio-buccal cusp tip of the mandibular first molar.

Distal U6 Distal surface of the upper first molar, perpendicular to the occlusal plane.

Mesial U6 Mesial surface of the upper first molar, perpendicular the occlusal plane.

Distal L6 Distal surface of the lower first molar, perpendicular to the occlusal plane.

Mesial L6 Mesial surface of the lower first molar, perpendicular to the occlusal plane.

L1 LabioGingival Border Labial cemento-enamel junction (CEJ) of the lower central incisor.

L1 Tip Tip of the lower central incisor.

L1 Root Root Apex of the lower central incisor.

L1 LinguoGingival Border Lingual cemento-enamel (CEJ) of the lower central incisor.

U1 LabioGingival Border Labial cemento-enamel (CEJ) of the upper central incisor.

U1 Tip Incisal tip of upper central incisor.

U1 Root Root apex of the upper central incisor.

U1 LinguoGingival Border Lingual cemento-enamel junction (CEJ) of the upper central incisor.

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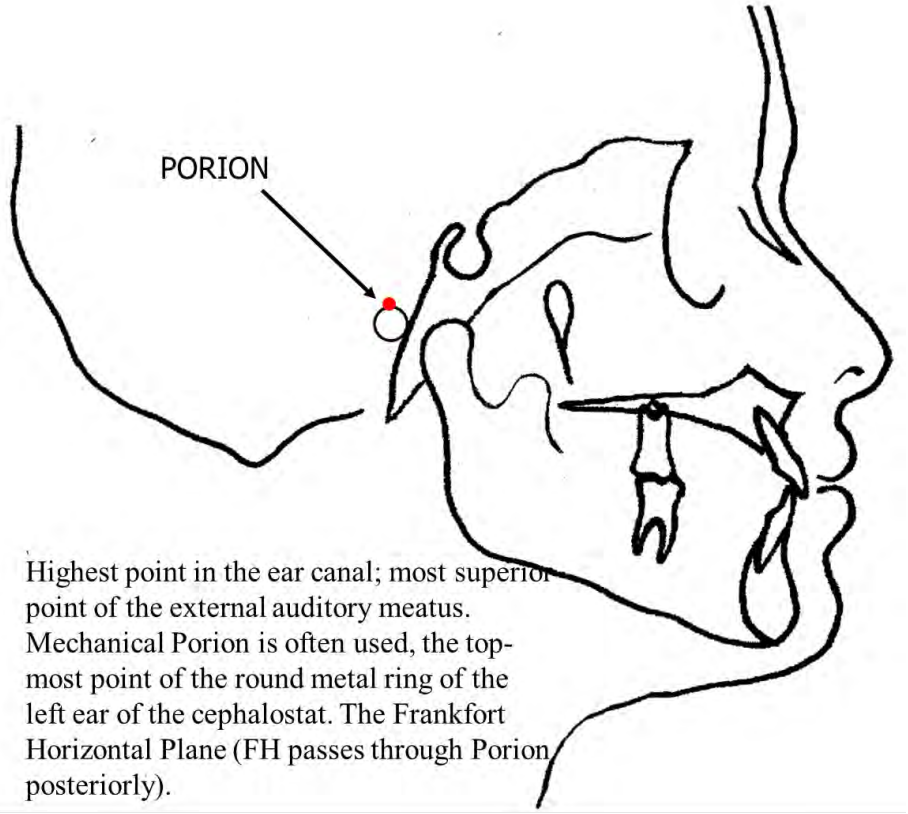
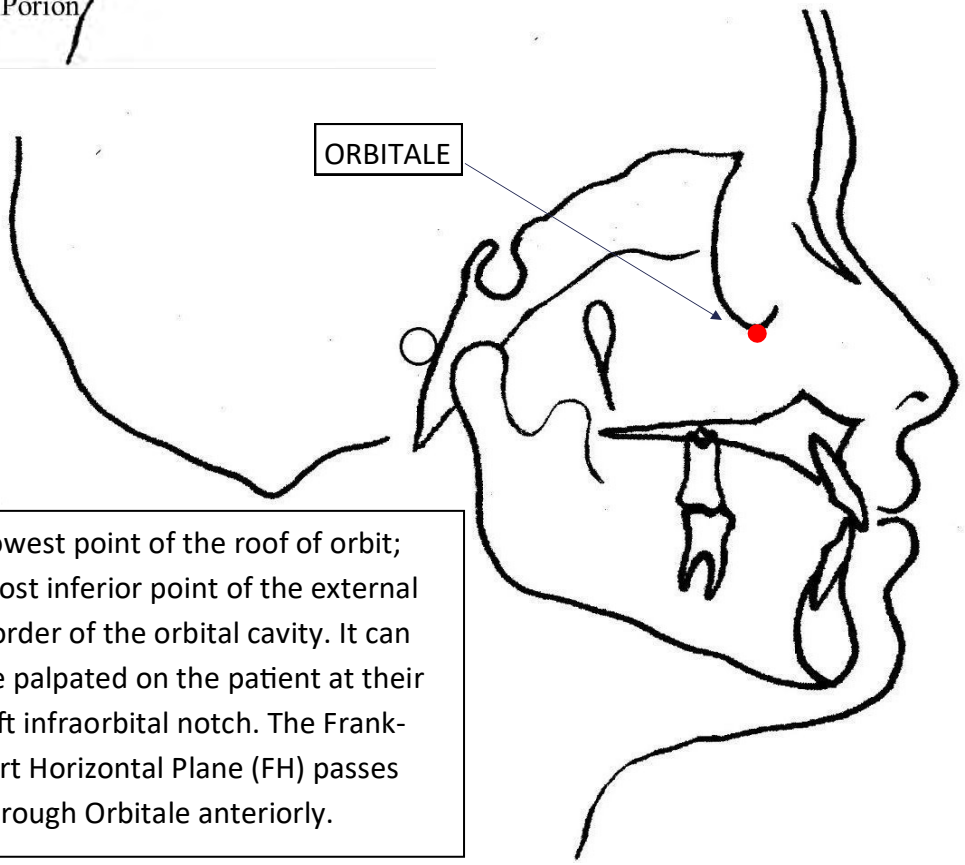
LATERAL CEPHALOMETRIC VIEW

- The following are the necessary landmarks, points and planes used in the analysis.
- I have omitted all the points used to describe the soft tissue landmarks necessary to use a computer program.
- If you are tracing by hand, the soft tissue and hard tissues are simply traced and the teeth are drawn w/o attention to a long list of points used to prompt the computer.



Highest point in the ear canal; most superior point of the external auditory meatus. Mechanical Porion is often used, the topmost point of the round metal ring of the left ear of the cephalostat. The Frankfort Horizontal Plane (FH passes through Porion posteriorly).



Lowest point of the roof of orbit; most inferior point of the external border of the orbital cavity. It can be palpated on the patient at their left infraorbital notch. The Frankfort Horizontal Plane (FH) passes through Orbitale anteriorly.

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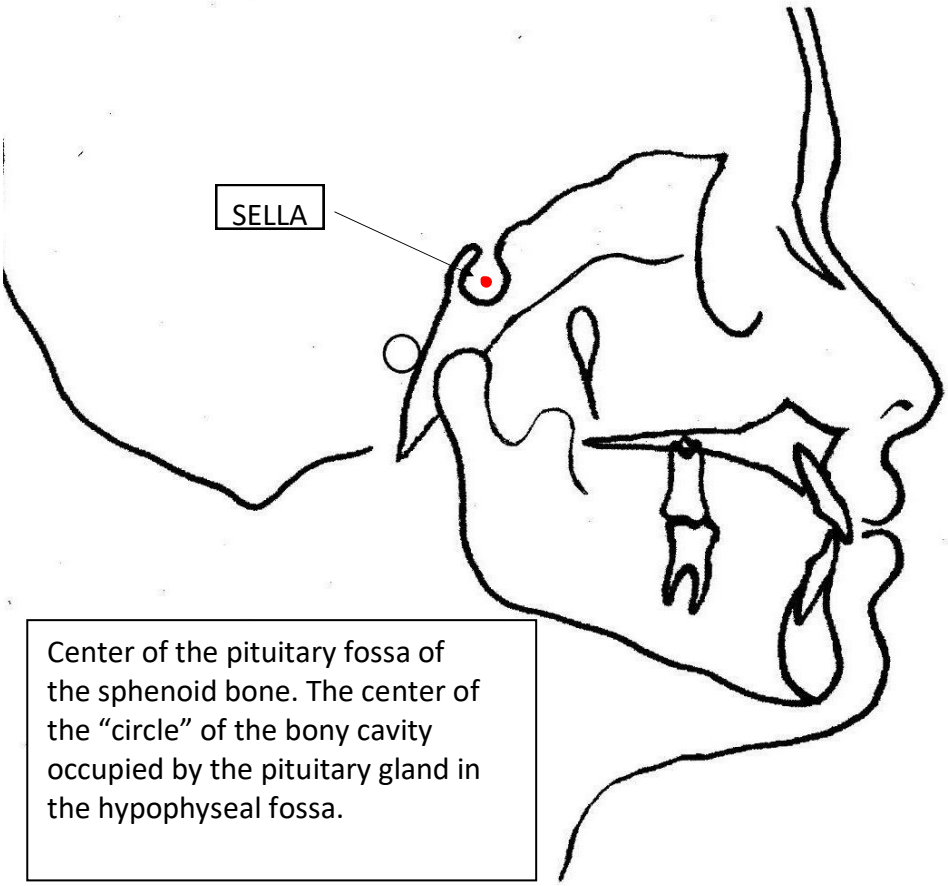
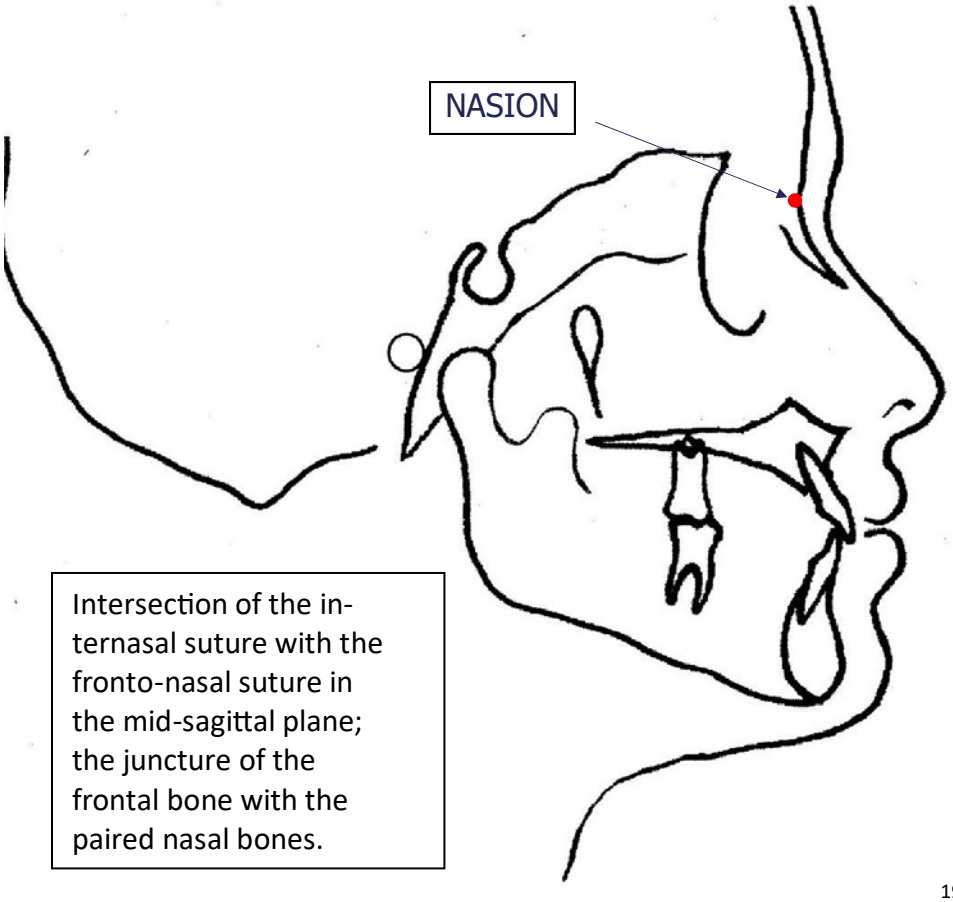


Center of the pituitary fossa of the sphenoid bone. The center of the "circle" of the bony cavity occupied by the pituitary gland in the hypophyseal fossa.



Intersection of the internasal suture with the fronto-nasal suture in the mid-sagittal plane; the juncture of the frontal bone with the paired nasal bones.

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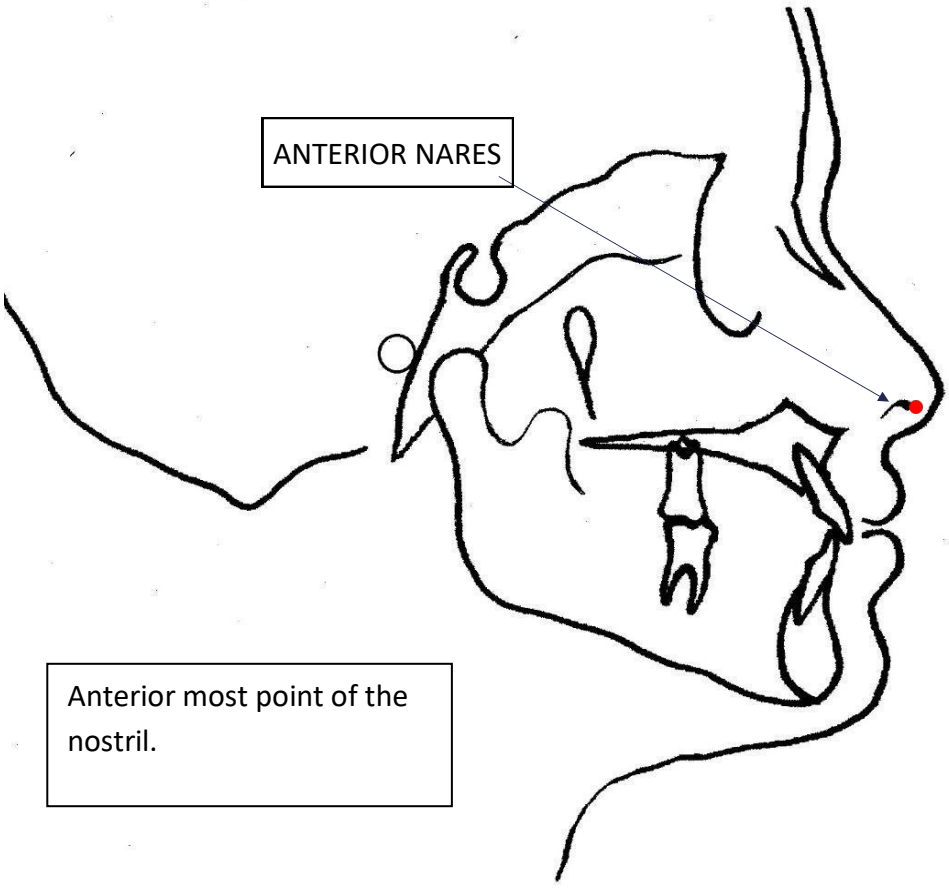
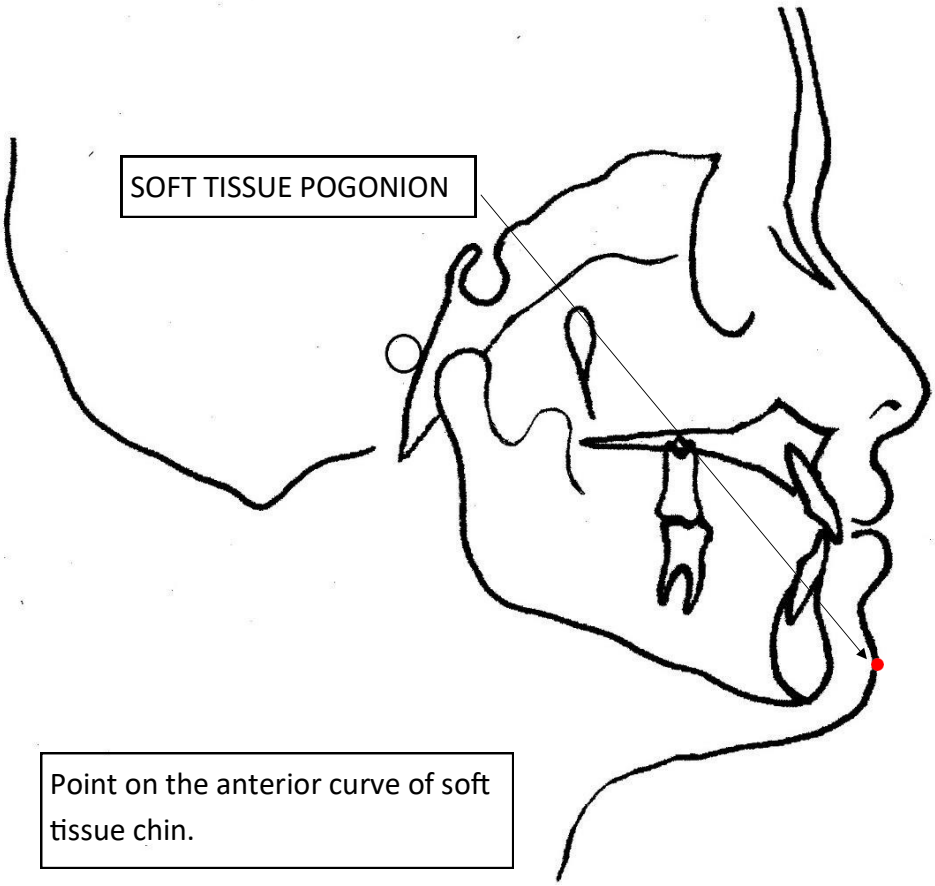


Anterior most point of the nostril.



Point on the anterior curve of soft tissue chin.

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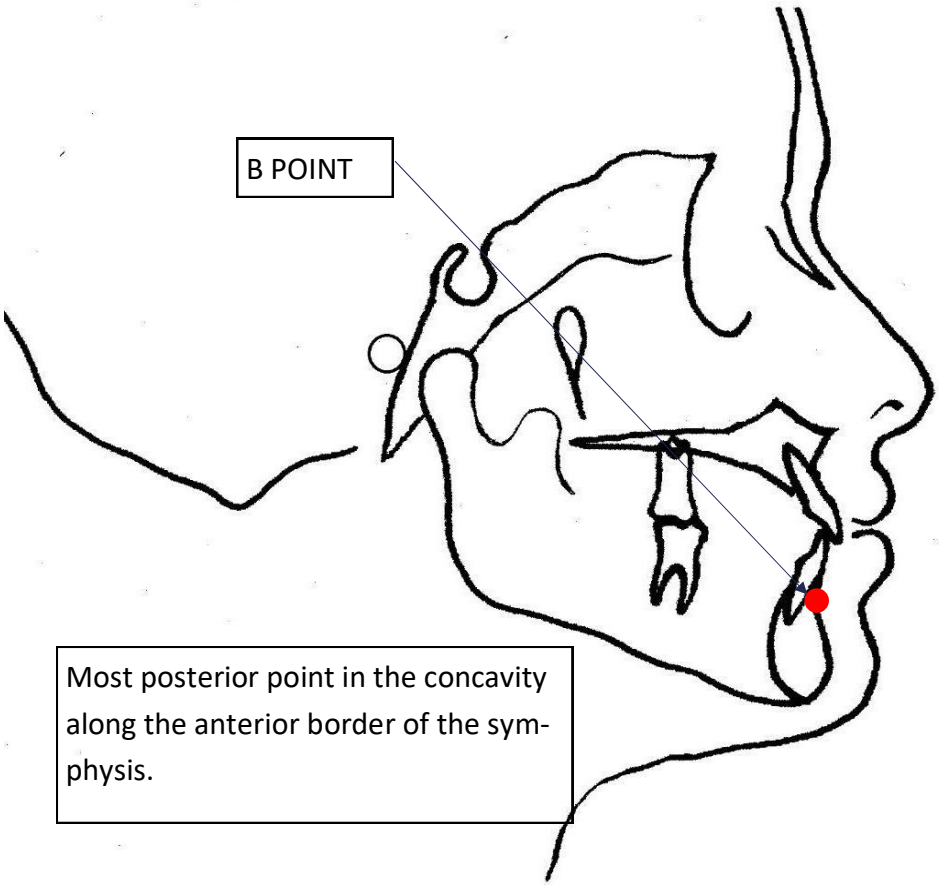

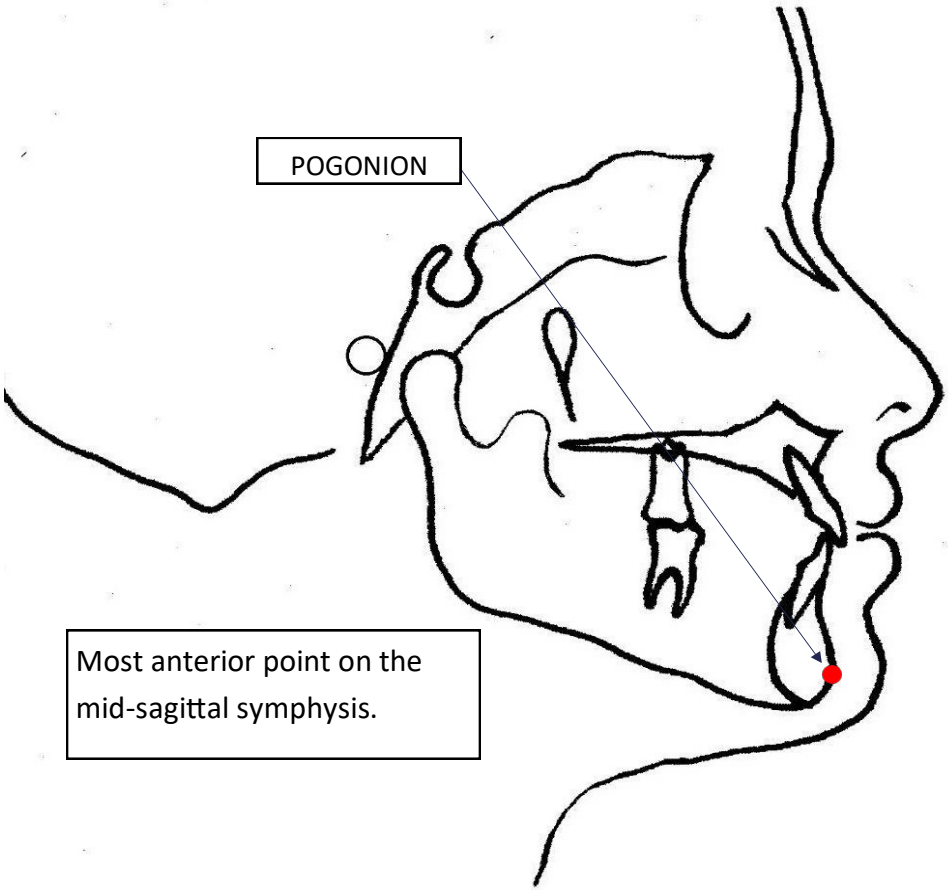

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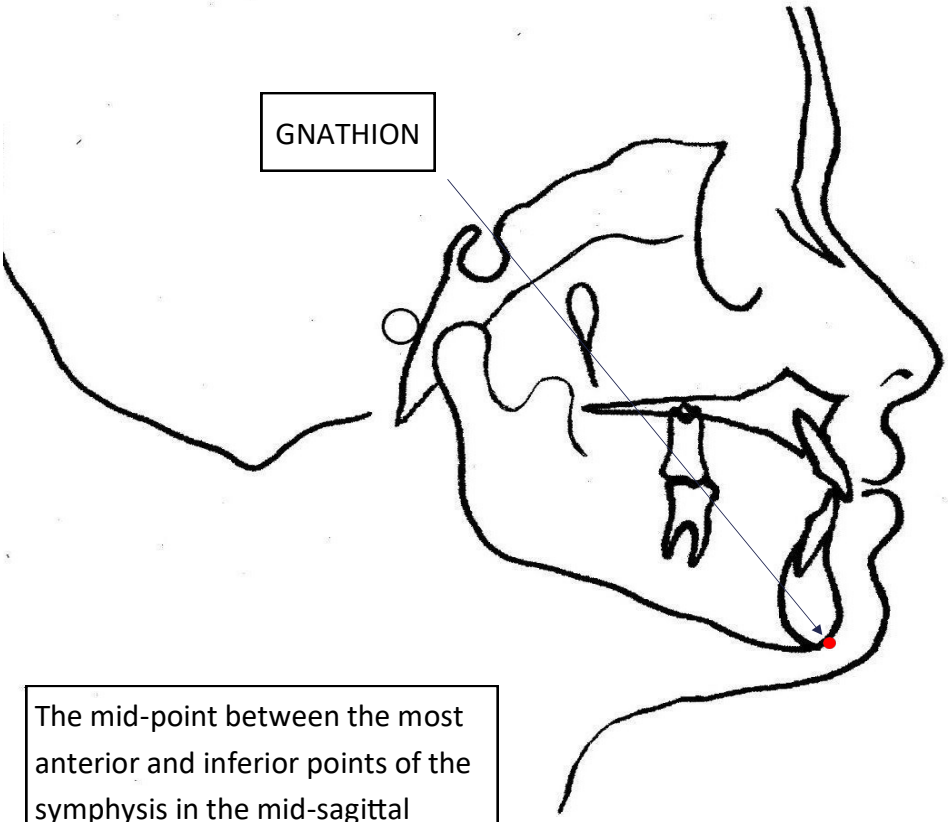
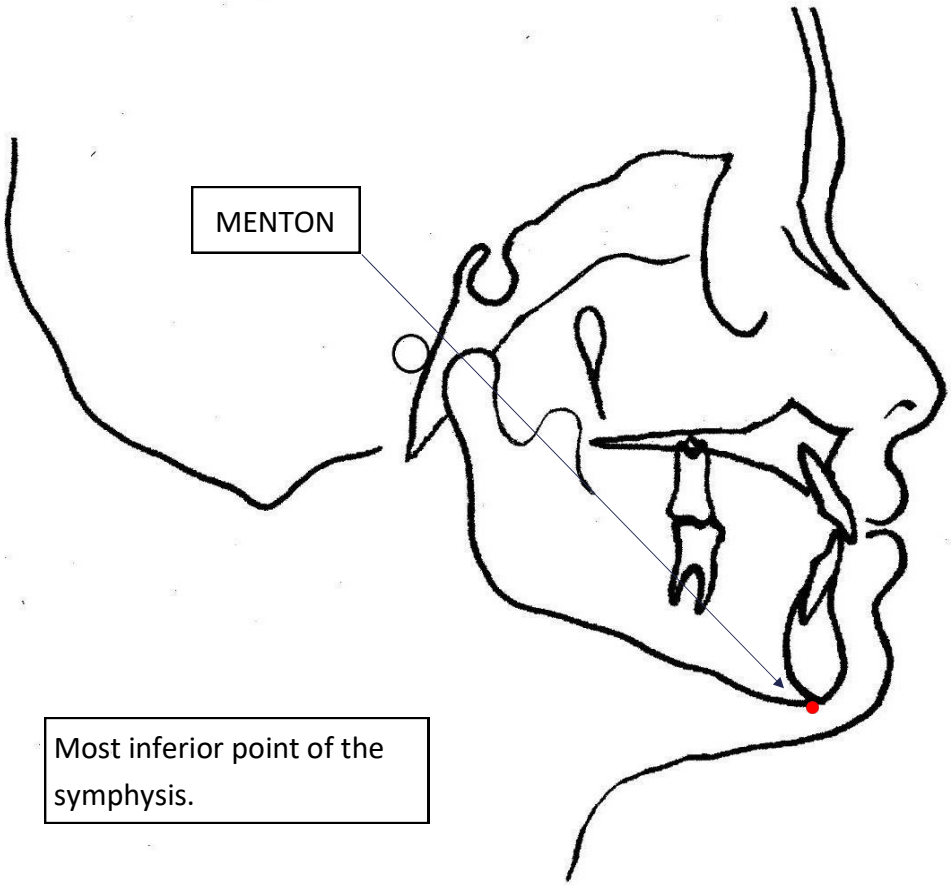


The mid-point between the most anterior and inferior points of the symphysis in the mid-sagittal plane.



Most inferior point of the symphysis.

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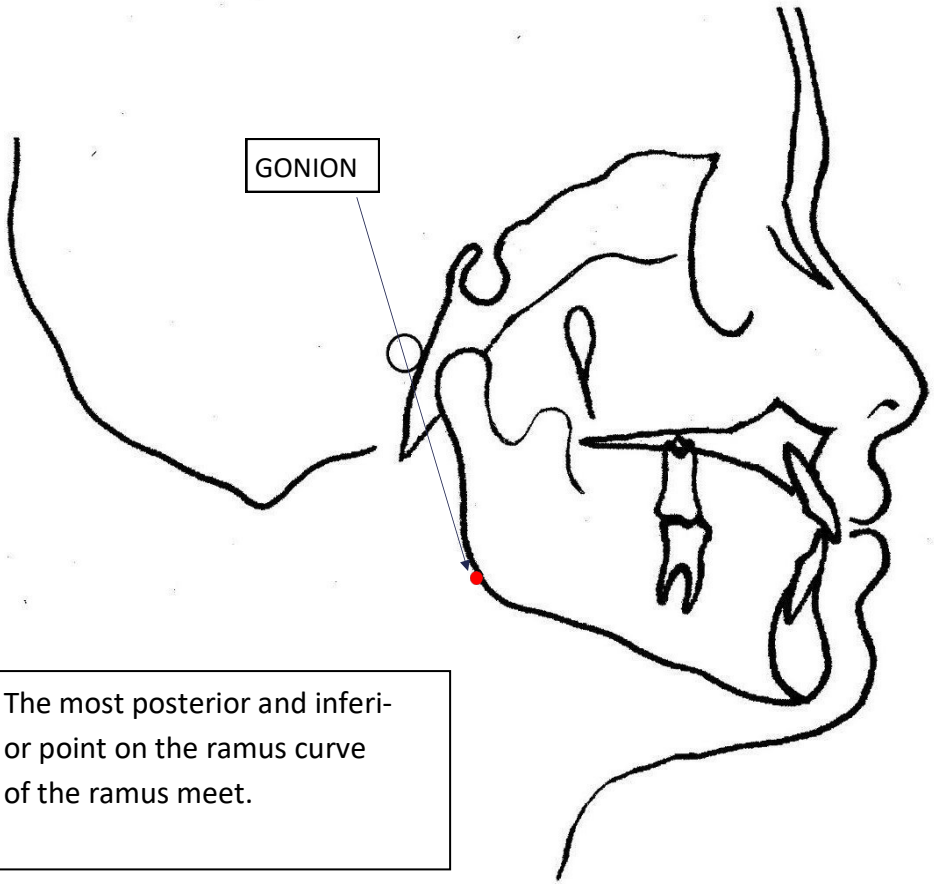
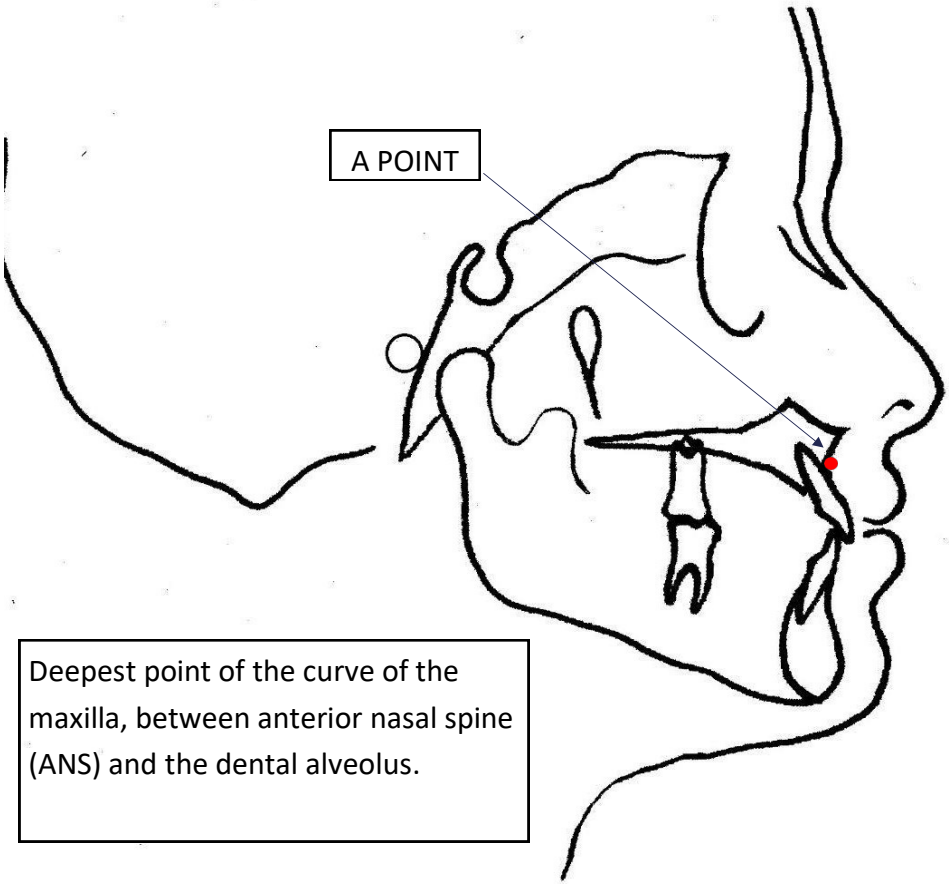


The most posterior and inferior point on the ramus curve of the ramus meet.



Deepest point of the curve of the maxilla, between anterior nasal spine (ANS) and the dental alveolus.

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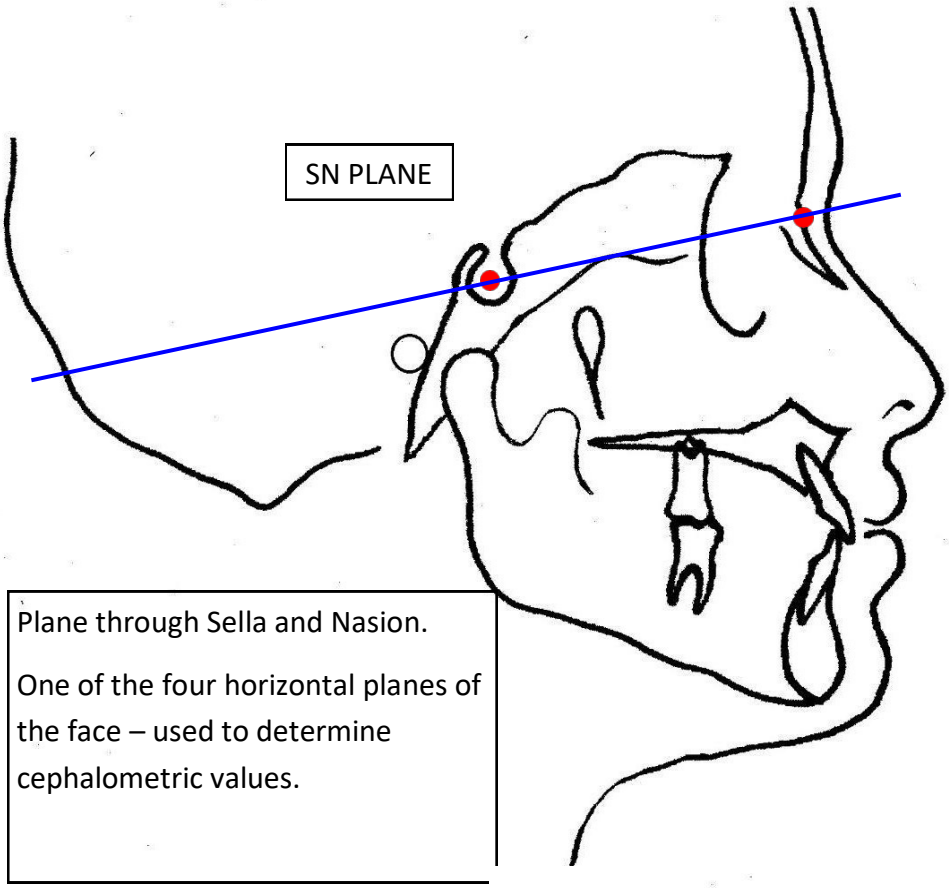
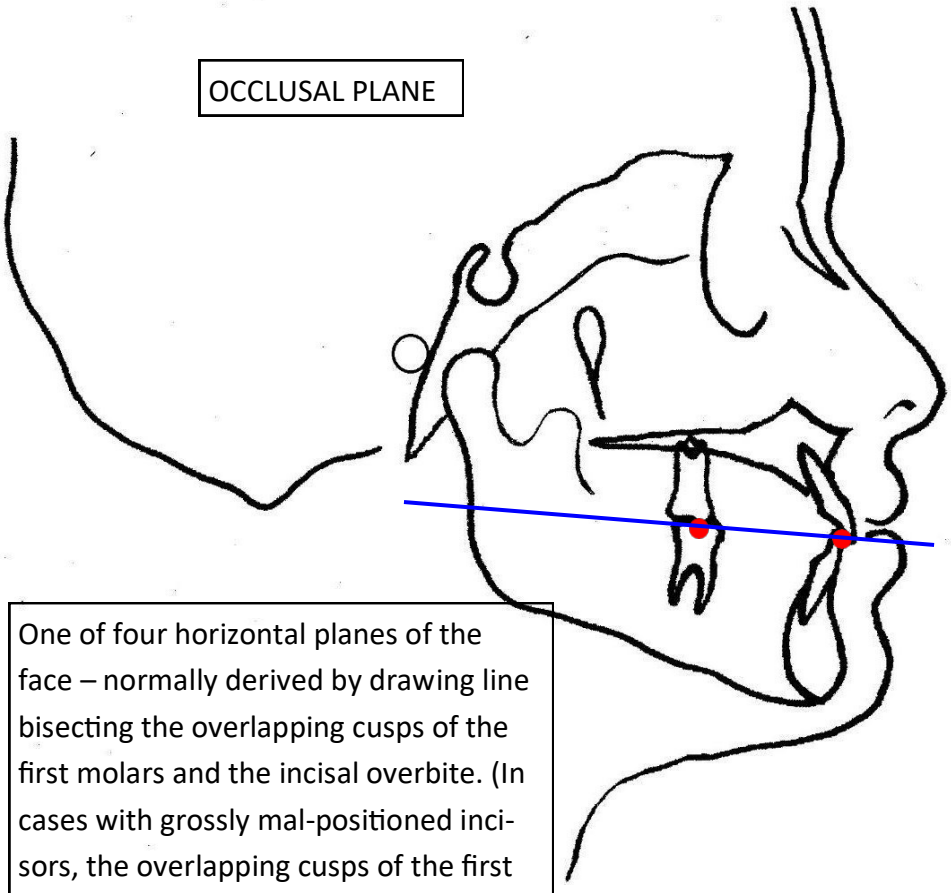
SN PLANE



Plane through Sella and Nasion.

One of the four horizontal planes of the face – used to determine cephalometric values.

OCCLUSAL PLANE



One of four horizontal planes of the face – normally derived by drawing line bisecting the overlapping cusps of the first molars and the incisal overbite. (In cases with grossly mal-positioned incisors, the overlapping cusps of the first premolars are substituted for the incisal overbite).

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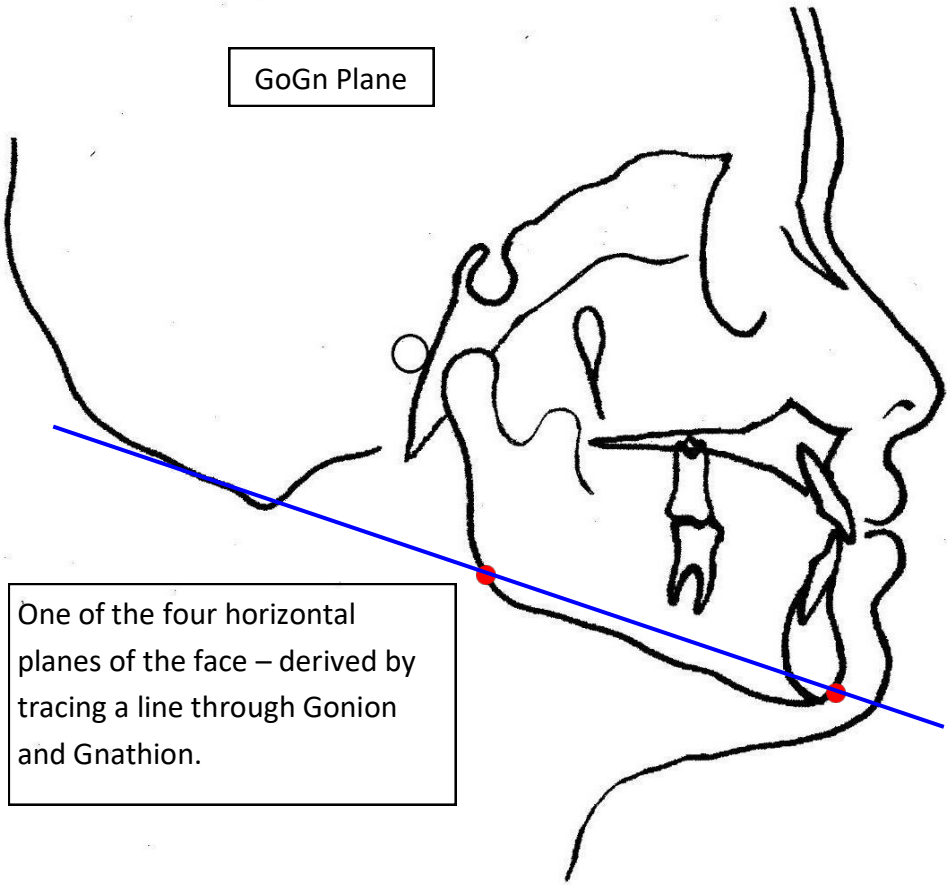
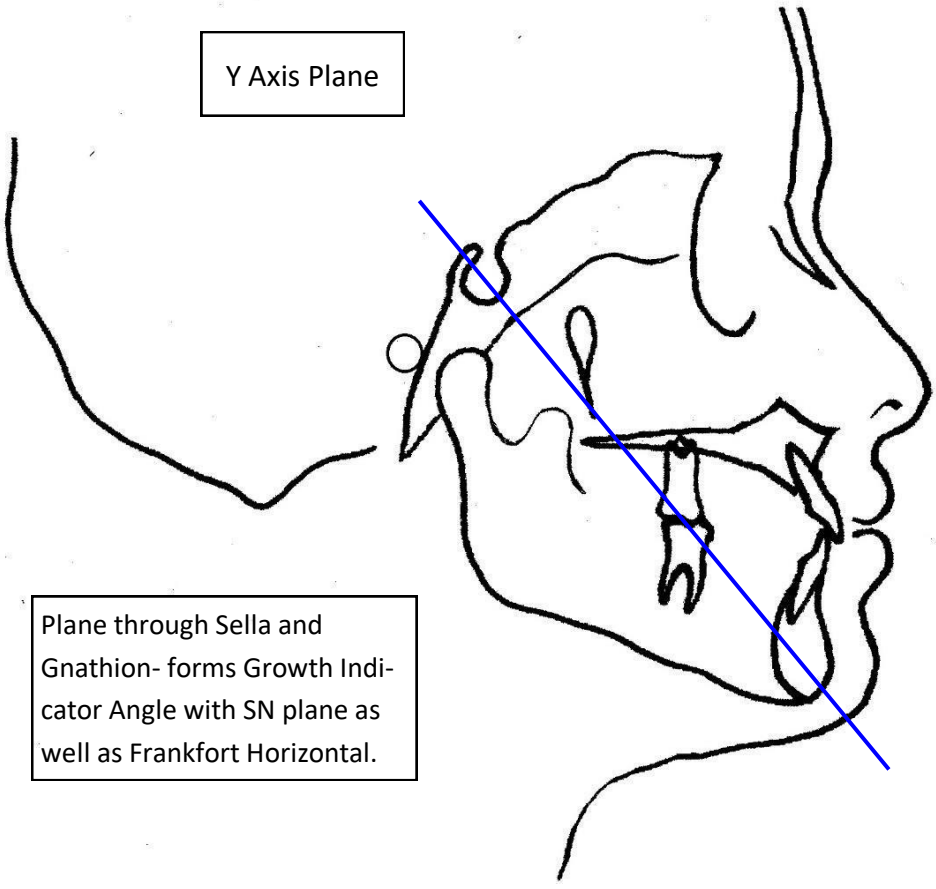
GoGn Plane



One of the four horizontal planes of the face – derived by tracing a line through Gonion and Gnathion.

Y Axis Plane



Plane through Sella and Gnathion- forms Growth Indicator Angle with SN plane as well as Frankfort Horizontal.

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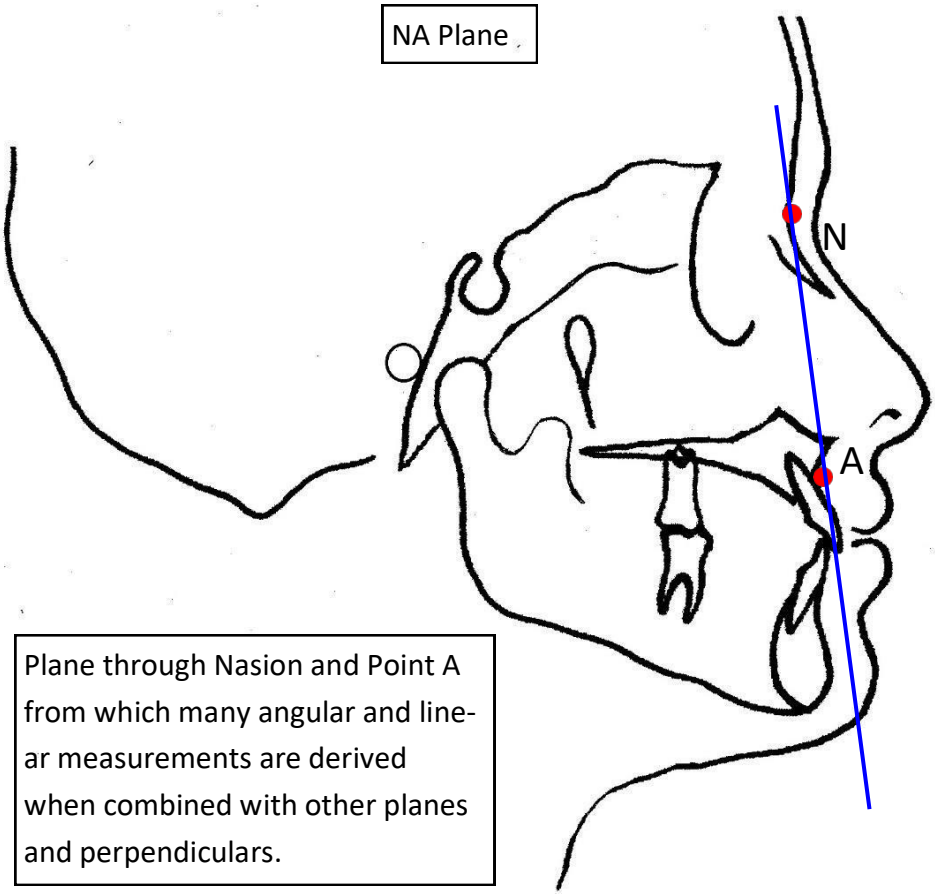
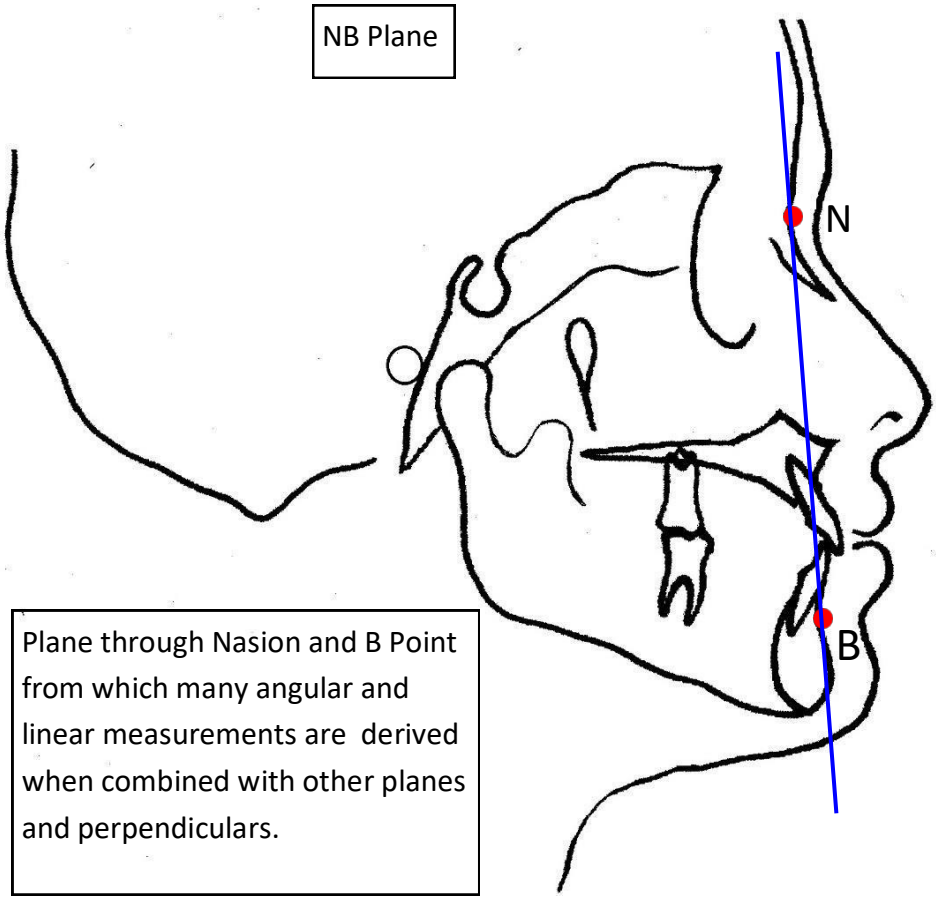
NA Plane



Plane through Nasion and Point A from which many angular and linear measurements are derived when combined with other planes and perpendiculars.

NB Plane



Plane through Nasion and B Point from which many angular and linear measurements are derived when combined with other planes and perpendiculars.

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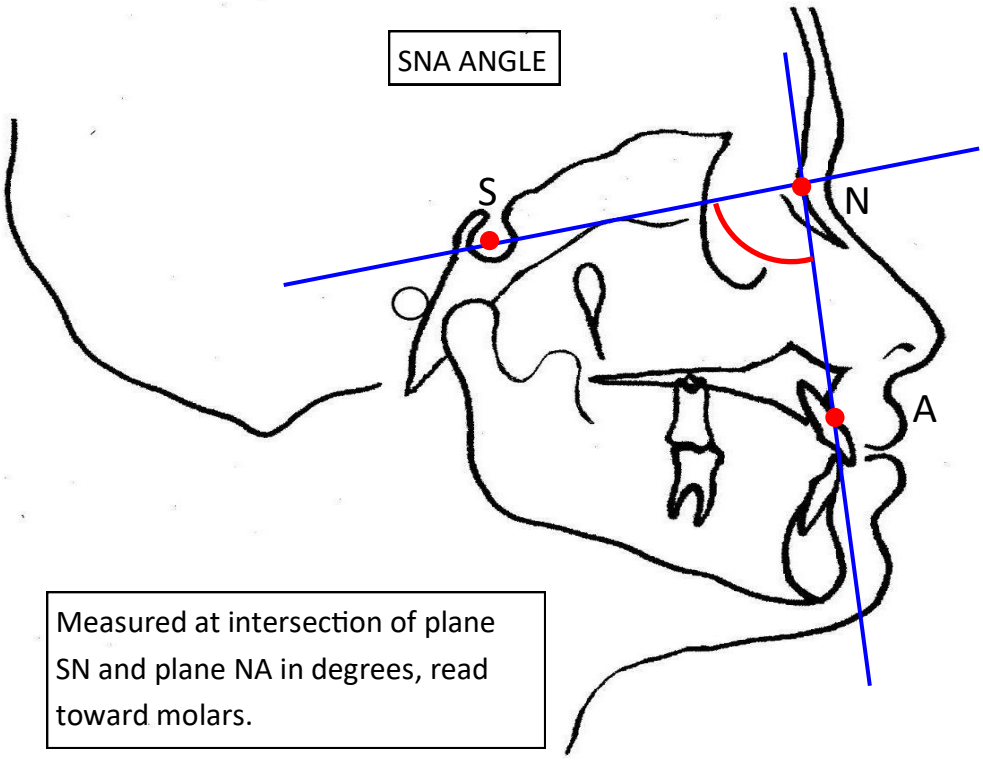
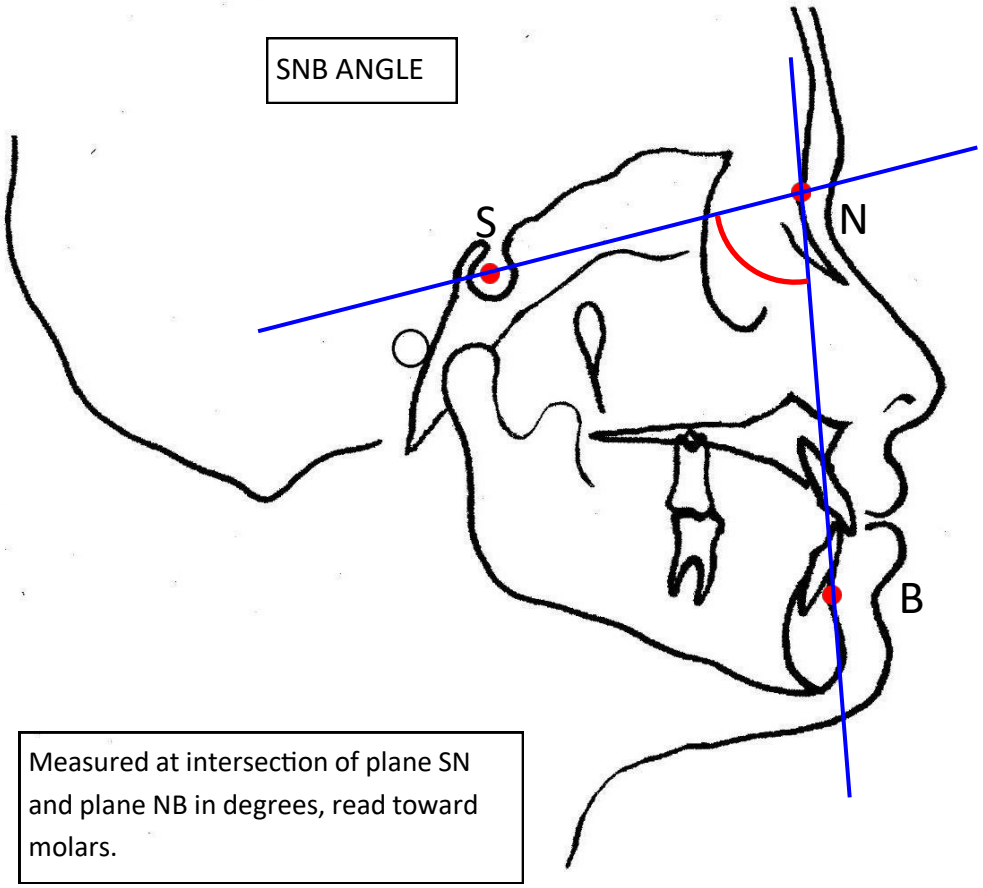
SNA ANGLE



Measured at intersection of plane SN and plane NA in degrees, read toward molars.

SNB ANGLE



Measured at intersection of plane SN and plane NB in degrees, read toward molars.

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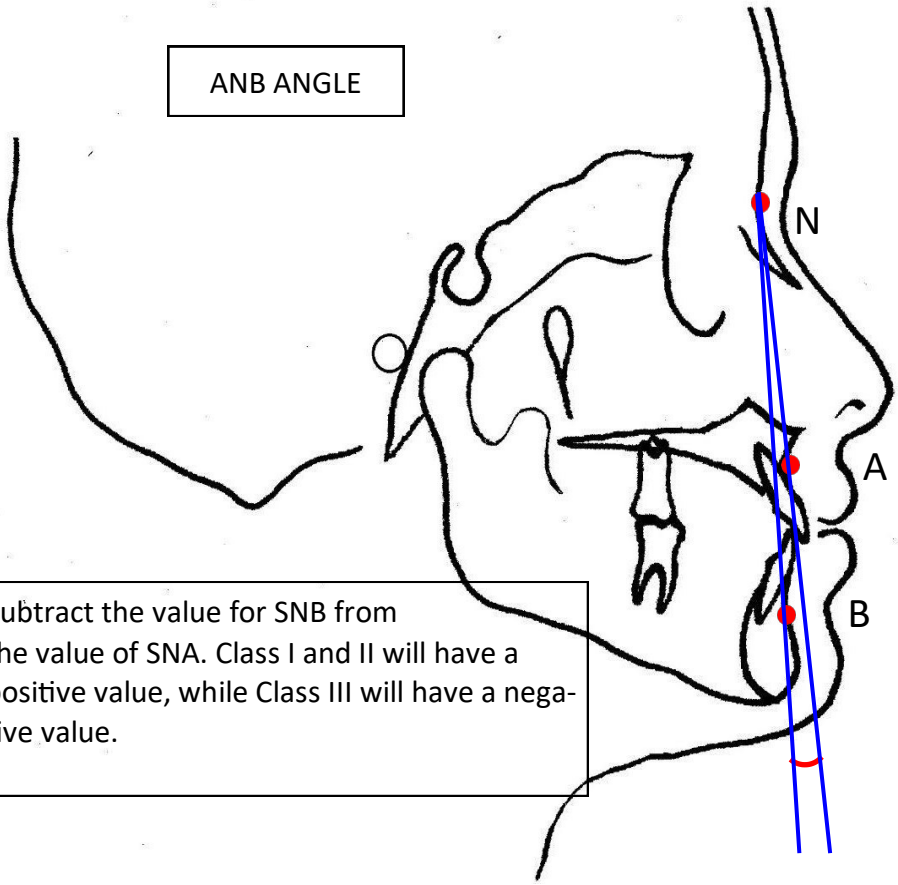
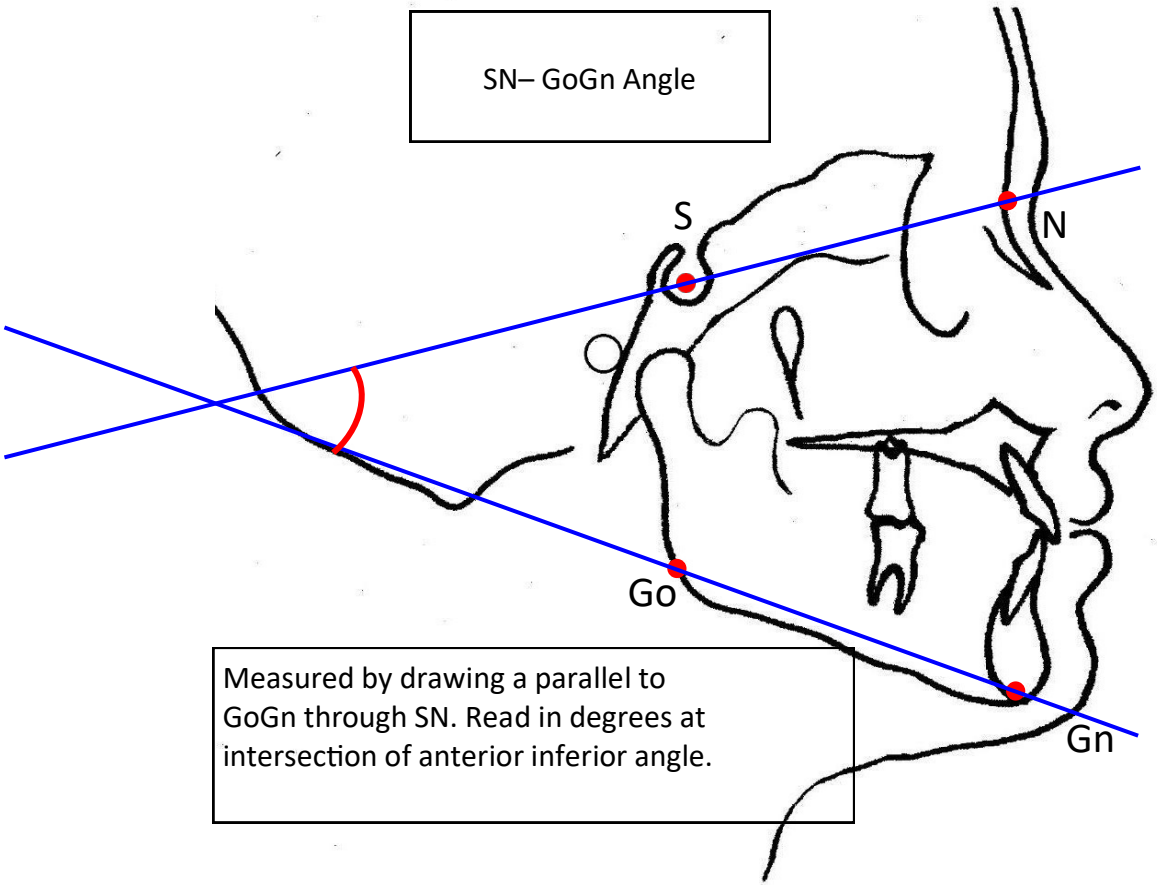
ANB ANGLE



Subtract the value for SNB from the value of SNA. Class I and II will have a positive value, while Class III will have a negative value.

SN– GoGn Angle



Measured by drawing a parallel to GoGn through SN. Read in degrees at intersection of anterior inferior angle.

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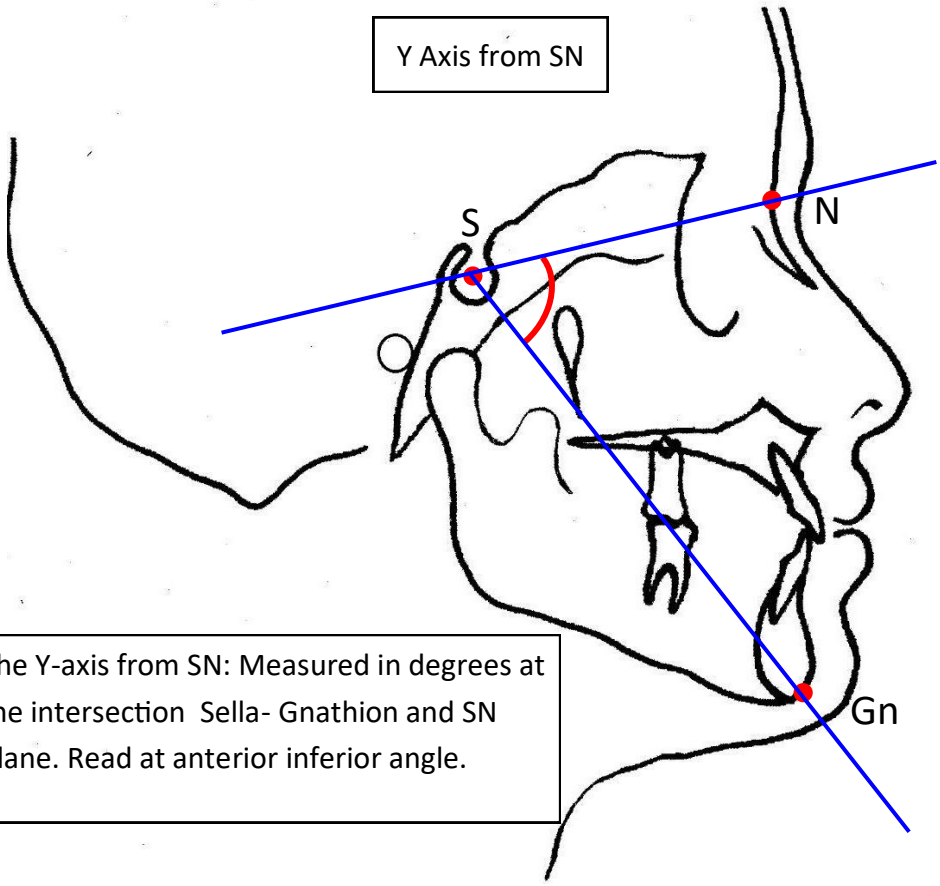
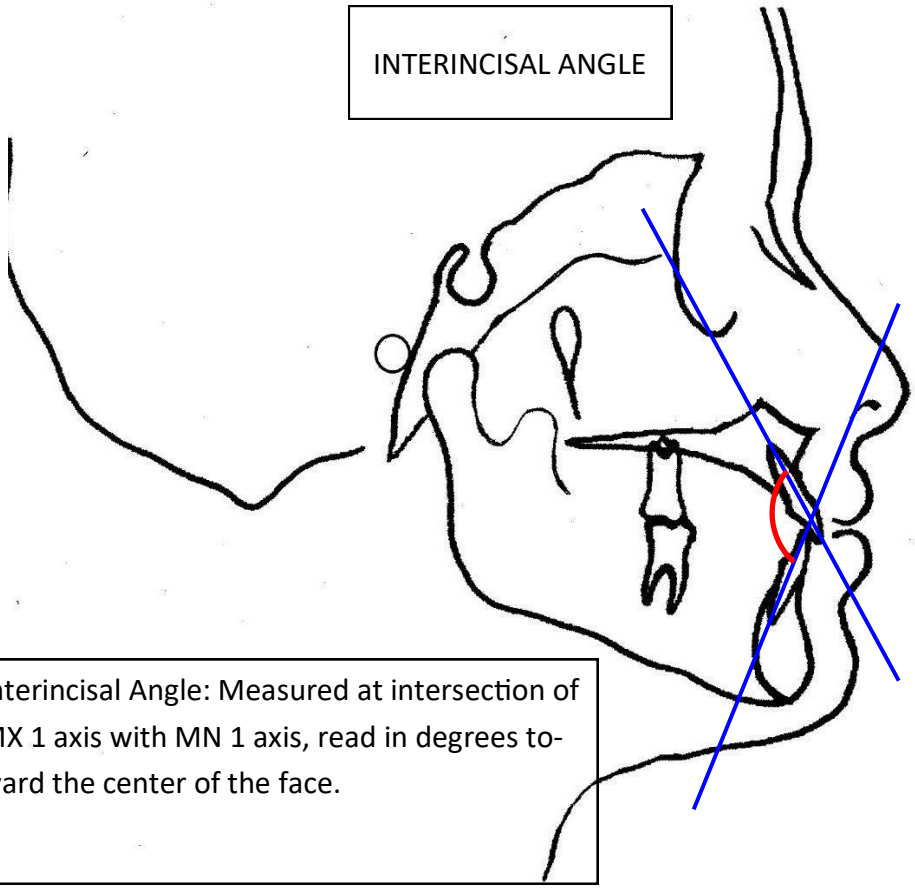
Y Axis from SN



The Y-axis from SN: Measured in degrees at the intersection Sella- Gnathion and SN plane. Read at anterior inferior angle.

INTERINCISAL ANGLE



Interincisal Angle: Measured at intersection of MX 1 axis with MN 1 axis, read in degrees toward the center of the face.

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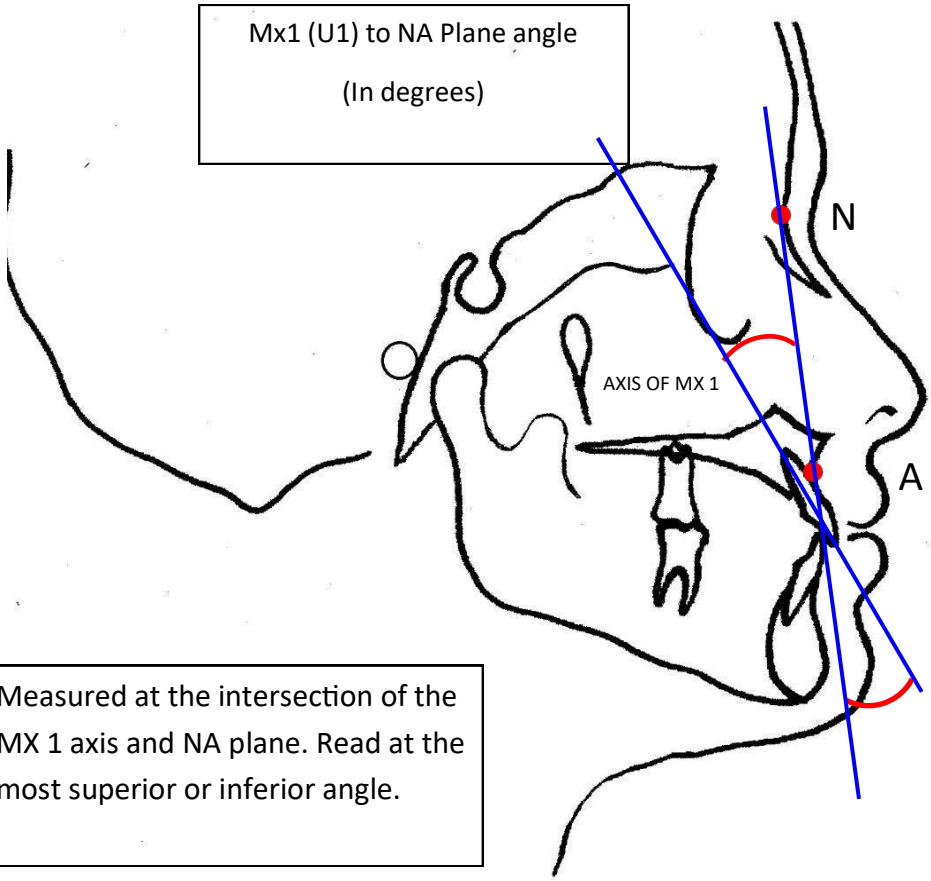
Mx1 (U1) to NA Plane angle

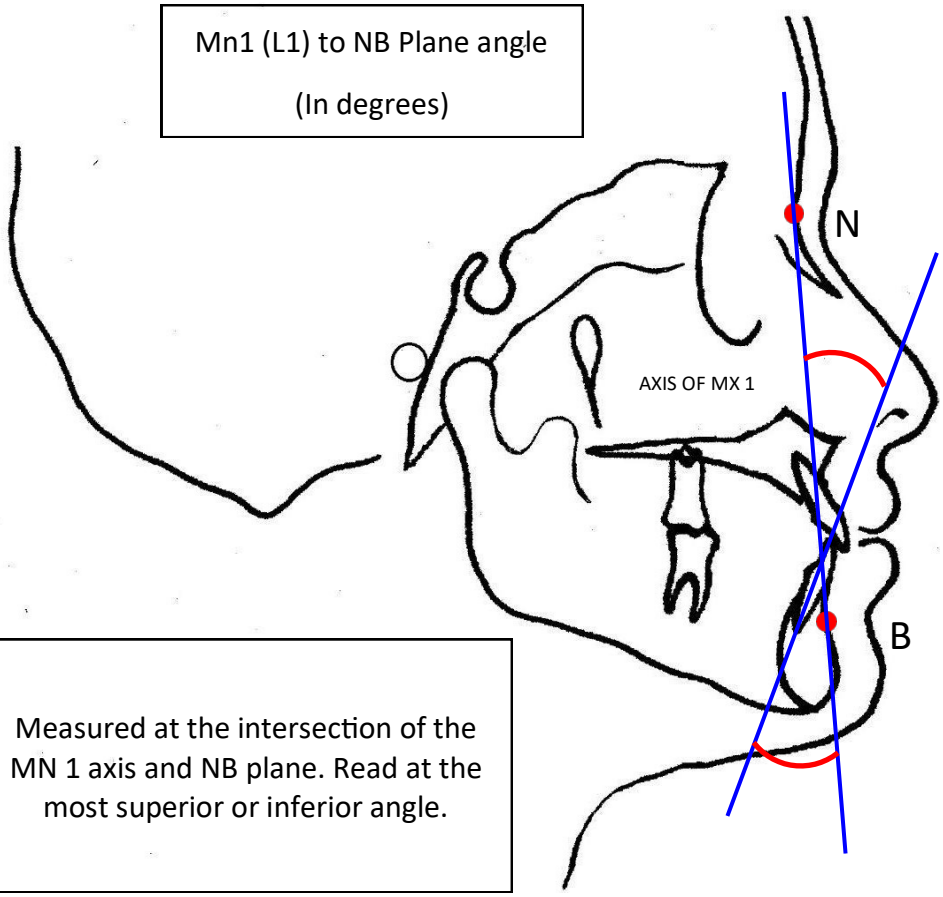
(In degrees)



Measured at the intersection of the MX 1 axis and NA plane. Read at the most superior or inferior angle.

Mn1 (L1) to NB Plane angle

(In degrees)



Measured at the intersection of the MN 1 axis and NB plane. Read at the most superior or inferior angle.

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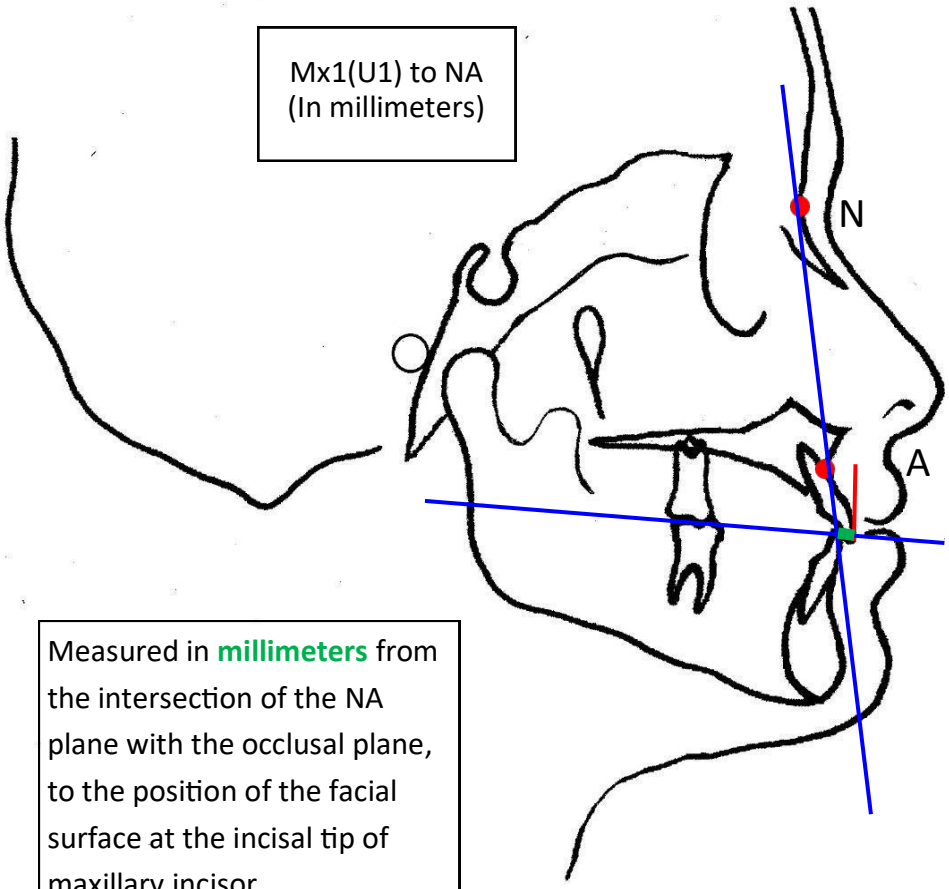
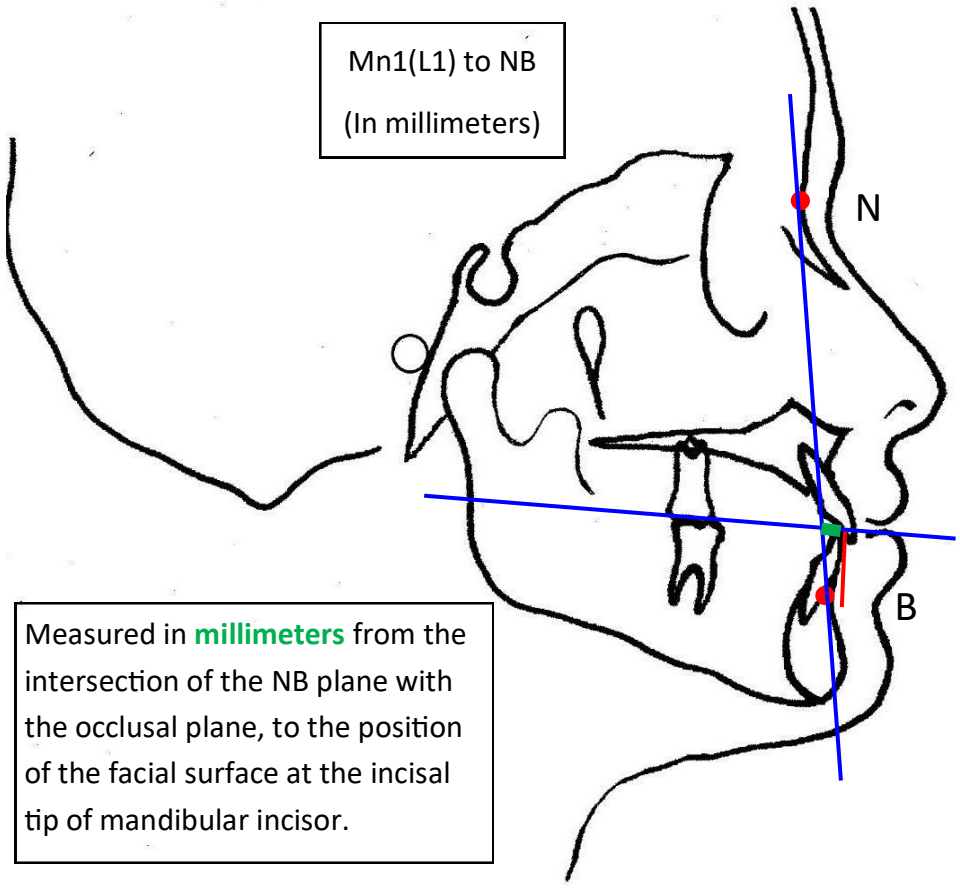
Mx1(U1) to NA
(In millimeters)



Measured in **millimeters** from the intersection of the NA plane with the occlusal plane, to the position of the facial surface at the incisal tip of maxillary incisor.

Mn1(L1) to NB
(In millimeters)



Measured in **millimeters** from the intersection of the NB plane with the occlusal plane, to the position of the facial surface at the incisal tip of mandibular incisor.

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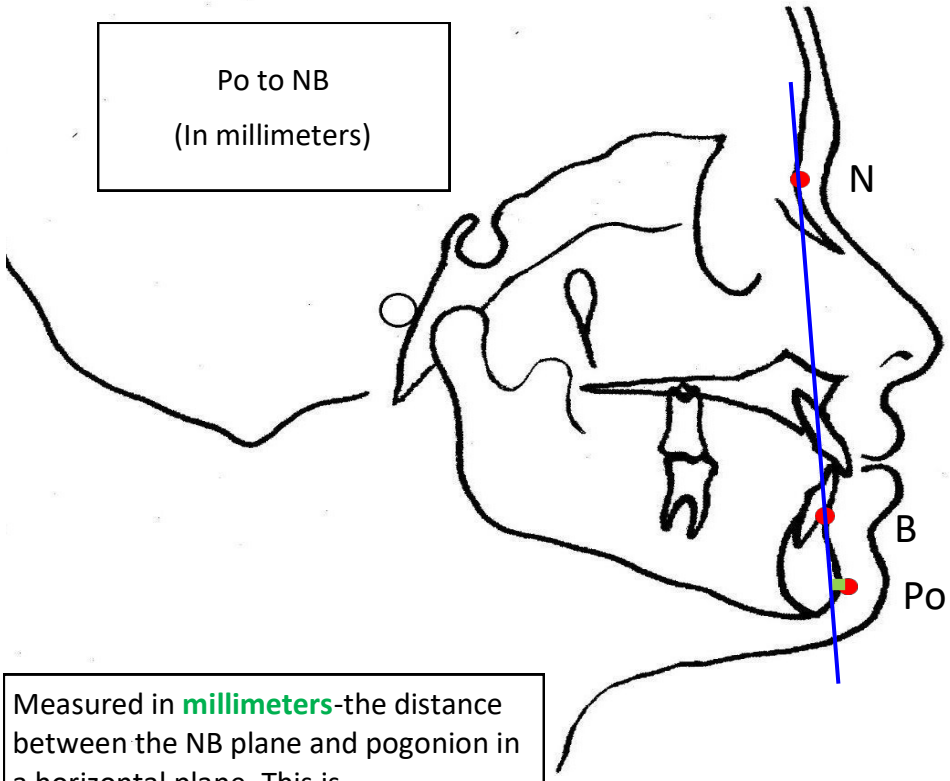
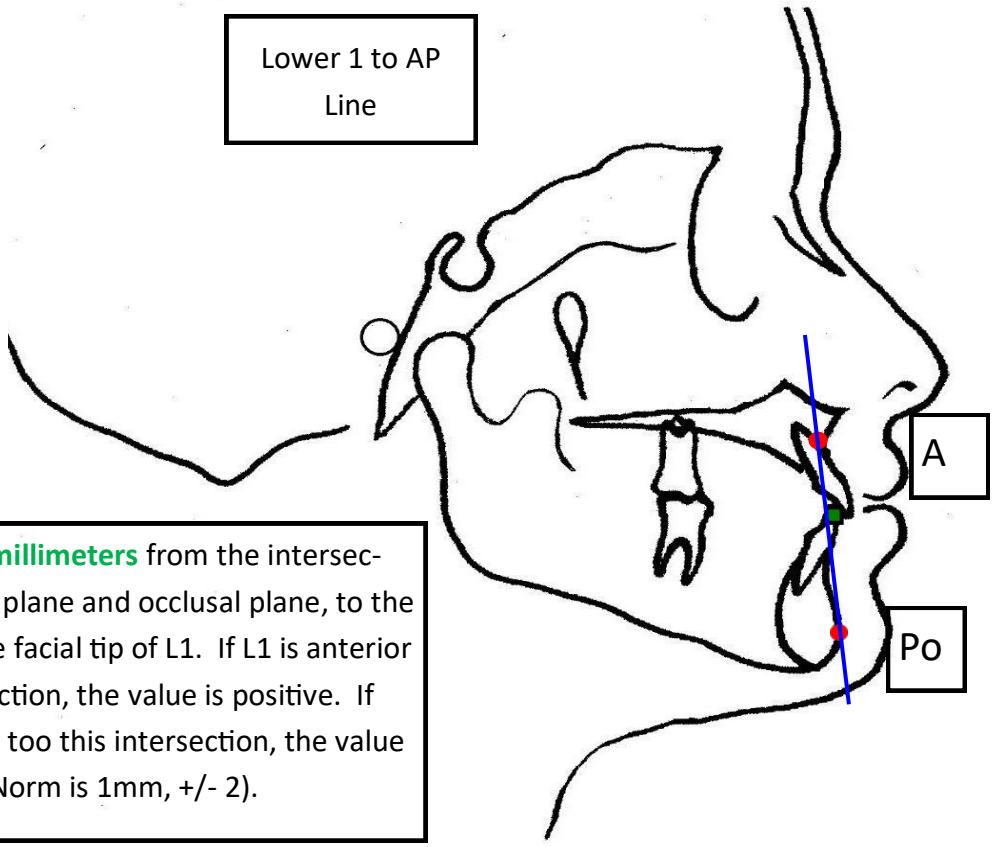
Po to NB
(In millimeters)



Measured in **millimeters**-the distance between the NB plane and pogonion in a horizontal plane. This is important to know as it correlates to growth of the individual's chin.

Lower 1 to AP
Line



Measured in **millimeters** from the intersection of the AP plane and occlusal plane, to the position of the facial tip of L1. If L1 is anterior to this intersection, the value is positive. If L1 is posterior too this intersection, the value is negative. (Norm is 1mm, +/- 2).

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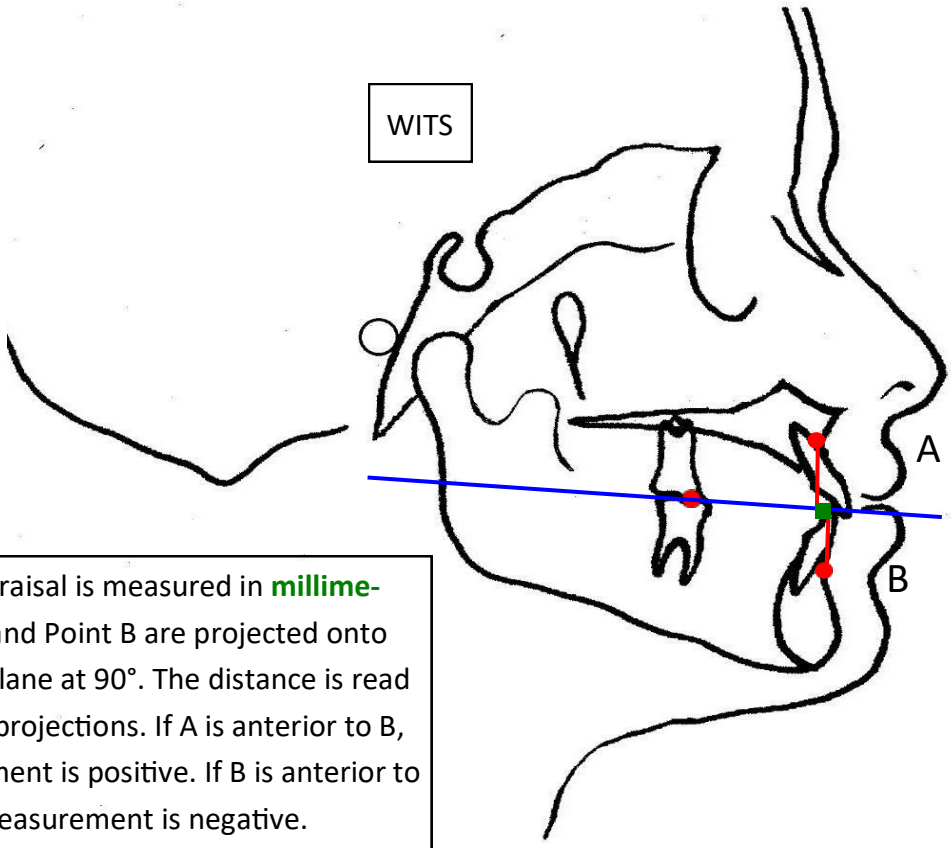
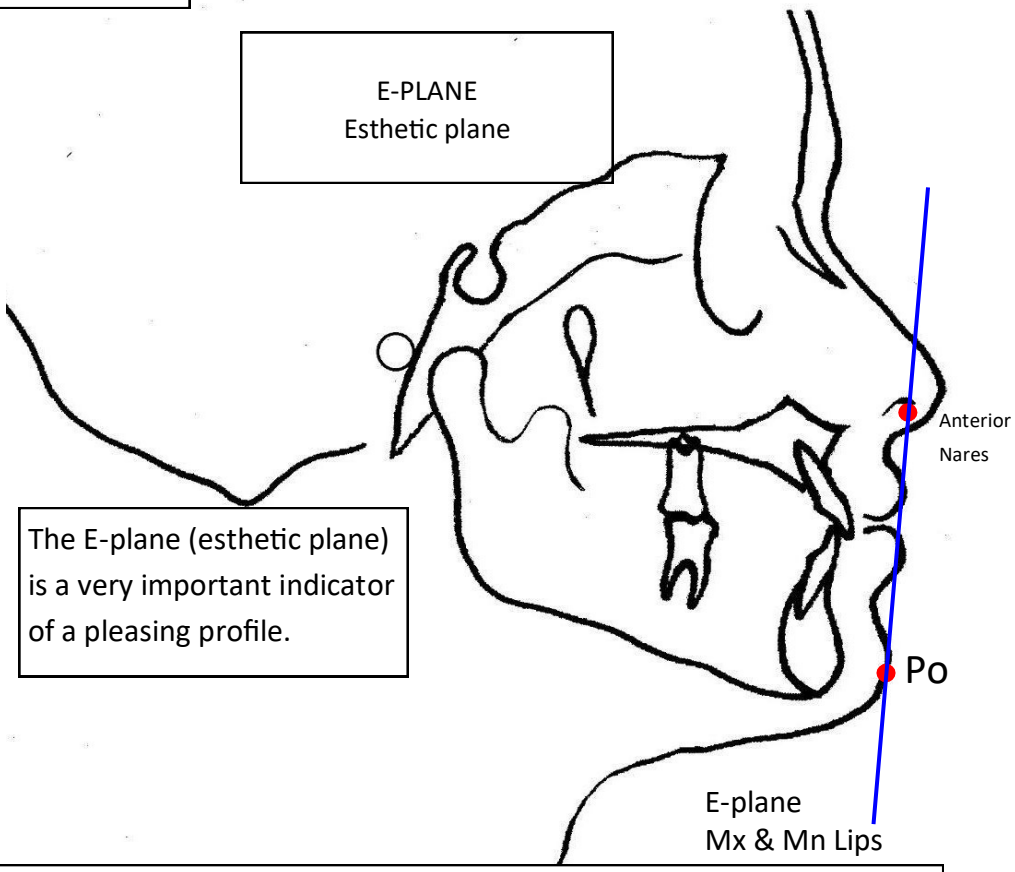
WITS



The WITS appraisal is measured in **millimeters**. Point A and Point B are projected onto the occlusal plane at 90°. The distance is read between the projections. If A is anterior to B, the measurement is positive. If B is anterior to A, then the measurement is negative.

E-PLANE
Esthetic plane



The E-plane (esthetic plane) is a very important indicator of a pleasing profile.

A line is drawn from the anterior Nares to Soft Tissue Pogonion. Upper and Lower Lips are measured as positive, anterior to the line, 0 on the line and negative, posterior to the line. The normal E-plane is 0 to +2 mm to the upper and the lower lips. Balanced lips indicate a pleasing profile.

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FUNDAMENTAL FINDINGS OF A CEPHALOMETRIC FILM

Skeletal Classification: Class I, Class II, Class III

- The WITS
- ANB

Growth Pattern:

- Dolichocephalic, Mesocephalic, or Brachycephalic
- The SN to GoGn
- The Y axis

Soft Tissue Esthetics:

- Modified E Plane

Position of L1:

- L1 to NB
- Po to NB
- L1 to AP
- Cephalometric crowding

Airway Compromise

- Tonsils
- Adenoids
- Cloudy sinuses

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SOFT TISSUE PROFILE ANALYSIS

Esthetic Plane (Modified E Plane)

- The horizontal soft tissue profile is an aid in diagnosis.
- A line drawn from the soft tissue of the chin through anterior nares.
- The lips should fall on or slightly in front of this line to achieve a pleasing profile. This line is referred to as the Modified E-Plane.
- Clinical studies have documented that the convexity of the profile will lessen with age.
- This is true of all individuals, male and female, regardless of treatment.
- Finishing cases somewhat full is not a concern because the patient's profile will continue to flatten.

CEPHALOMETRIC DIAGNOSTIC SUMMARY

- Dental models or exam tells us the molar relationship of the 6s.
- Age tells us if the patient is in a growth spurt and how much Pogonion may still grow.
- SNA and SNB tells us if they are in normal limits.
- WITS confirms normal limits.
- Look at Soft Tissue Profile.
- WE CAN move lower incisors forward to eliminate crowding IF Pogonion and apical bone is ample or is going to grow.
- SO, check lower incisor to NB to see if it CAN be moved forward, backward, or remain the same.
- Check SN-GoGn to determine if the patient is a clockwise, counter- clockwise, or neutral grower.

TRACED AND INTERPRETED CEPHALOGRAM

ANB CL I CLII CLIII (skeletal relative to the cranial base)
WITS CL I CLII CLIII (skeletal relative to the apical base)

GoGn-SN			
Y Axis (SN)	Counter Clk	Normal	Clockwise
Y Axis (FH)	Horizontal	Neutral	Vertical
Profile	Concave	Flat	Convex
(mandible)	Prognathic		Retrognathic

Lower 1 to NB
Lower 1 to Po at least a 1:1 ratio
Possible Po Growth

Cast Analysis: Dental Class I, II, III; overbite; overjet; tooth/arch discrepancy; Sim analysis; midlines

Other: Microdontia; macrodontia; peg laterals; early tooth loss/space loss; tongue thrust; thumb suck; airway; TMD

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Williams *Basic* Cephalometric Analysis

Patient:_____ **Age:**_____ **Date:**_____

Measurement	Value	Norm	Notes
SNA	_____	82° +/- 4°	_____
SNB	_____	80° +/- 4°	_____
ANB	_____	0 to 4°	_____
SN-GoGn	_____	32° +/- 5°	_____
Y axis (SN)	_____	67° +/- 3°	_____
1/1 Angle	_____	131° +/- 4°	_____
U1 to NA°	_____	22° +/- 4°	_____
L1 to NB°	_____	25° +/- 4°	_____
U1 to NA mm	_____	4 +/- 2 mm	_____
L1 to AP line	_____	1 +/- 2 mm	_____
L1 to NB mm	_____	4 +/- 2 mm	_____
Po to NB mm	_____	2 +/- 2 mm	_____
WITS mm	_____	-1 mm +/- 1 mm	_____
E-plane MX lip	_____	0 - +2 mm	_____
E-plane MN lip	_____	0 - +2 mm	_____

Dental Classification (Class I, II, or III) ***(determined by model analysis, clinical examination and or photographs)***

Molar Difference	____R ____L	0 mm	+ = II; - = III
Cuspid Difference	____R ____L	0 mm	+ = II; - = III

Skeletal Classification (Class I, II, or III)

ANB	____ °	0 - 4°	> = II; < = III
WITS	____ mm	-1 +/- 1 mm	> = II; < = III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn	____ °	32° +/- 5°	> = Clock; < = Counter
Y Axis (SN)	____ °	67° +/- 3°	> = Clock; < = Counter

Proper Incisor Angulation

1/1 Angle	____ °	131° +/- 4°	> Retrusive; < Protrusive
U1 to NA	____ °	22° +/- 4°	> Protrusive; < Retrusive
L1 to NB	____ °	25° +/- 4°	> Protrusive; < Retrusive

Balanced Face – Esthetic Profile

L1 to AP line	___ mm	1 +/- 2 mm	>= Protrusive; < = Retrusive
U1 to NA	___mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
L1 to NB	___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
Po to NB	___ mm	Varies	
E Plane Mx Lip	___ mm	0 mm +/- 2 mm	< = Concave; > = Convex
E Plane Mn Lip	___ mm	0 mm +/- 2 mm	< = Concave; > = Convex

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Cephalometric Norms
For Williams Basic Analysis

- SNA range is 82 ° + / - 4°
- SNB range is 80 ° + / - 4°
- ANB range is 0 to 4°
- SN-GoGn range is 32° + / - 5°
- Y-axis from SN is 67° + / - 3
- Interincisal angle is 131° + / -4°
- U1 to NA is 22° +/- 4°
- L1 to NB is 25° +/- 4°
- U1 to NA is 4 mm +/- 2mm
- L1 to AP 1mm +/- 2mm
- L1 to NB is 4 mm +/- 2mm
- Po to NB is 2 mm +/- 2mm (Varies greatly between boys and girls)
- WITS is –1 mm + / - 1mm
- E-plane to upper lip is 0 to +2 mm
- E-plane to lower lip is 0 to +2 mm

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DEFINITIONS OF CEPHALOMETRIC LANDMARKS

(courtesy of AAO website)

Anterior Nasal Spine (ANS) The Median, sharp, bony process of the maxilla at the lower margin of the anterior nasal opening. It is considered by many as a separation of the upper face from the lower face.

Esthetic Plane (E plane) A plane extending from a point on the nose to the forward point of the soft tissue chin (soft tissue Pogonion). The outer margins of the lips are measured to this plane, to indicate too much lip support, too little lip support, or norm positions of the lips. A more accurate method of establishing the position of the E-plane is to find Steiner's "S" point, which is approximately equal to the anterior border of the nares (nasal opening). The lips are considered to be in norm relation when they touch or are parallel to the E- plane.

Facial Height The distance in millimeters from the Nasion to anterior nasal spine to pogonion on a lateral head film. In general, the ratio of the upper face height to the lower face height (UF/LF) is 50%/50% in young girls and boys. Later in young adulthood, males increase their lower face height so the ratio is closer to 45%/55%.

Gnathion (GN) The lowest point of the median plane in the lower border of the chin. It is a point on bony border palpated from below and naturally lies posterior to the tegumental border of the chin. In cephalometrics it is the midpoint between the most anterior and the most inferior points of the bony chin.

Gonion (Go) The lowest, posterior-most, and most outward point of the angle of the mandible. It is obtained by bisecting the angle formed by tangents of the lower and the posterior borders of the mandible. When both angles appear on the profile roentgenogram, the point midway between the right and left side is used.

Menton (M) The lowest point from which face heights are measured. It is the most inferior point of the bony chin, and lies posterior and inferior to Gnathion.

Nasion (N) The middle point of the fronto-nasal suture. The point at the root of the nose intersected by the median sagittal plane. The root of the nose corresponds to the fronto-nasal suture, but it is not always the lowest point of the forsum of the nose.

Nasion to Point A (NA) A cephalometric plane used to determine the relative prognathism of the maxillary denture base; also to which is compared the axis of the maxillary central incisor.

Nasion to Point B(NB) A cephalometric plane used to determine the relative prognathism of the mandibular denture base. Also to which is compared the axis of the mandibular central incisor.

Nasion to Point D (ND) A cephalometric plane used to determine the relative prognathism of the mandible without regard to the chin- button.

Occlusal Plane (Occl Pl) The occlusal plane of the teeth. A line drawn between points representing one half of the incisor overbite and one half of the cusp height of the last occluding molar.

Orbitale (O) The lowest point on the margin of the orbit. Since this point varies from person to person, even in the same subject, the orbital point in orthodontic measurement is usually accepted as the point on the lower margin of the orbit directly below the pupil when the eye is open and the patient is looking straight ahead.

Pogonion (P) The most anterior, prominent point of the chin.

Point A (A) A measuring point taken at the innermost curvature from the maxillary anterior nasal spine to the crest of the maxillary alveolar process; the most depressed area of bone between the anterior nasal spine and the labial crest of the alveolus at the most labially inclined maxillary central incisor.

Sella-Gnathion plane (Same as Y-axis of growth) Used to orient the balance vertical and horizontal growth seen in an individual. A measurement if 65 degrees +/- 5 indicates a neutral growth pattern. A greater measurement indicates a clockwise growth pattern and a lesser measurement indicates a counter-clockwise growth pattern. (Y-axis is also measured as it passes through the Frankfort horizontal. A neutral growth pattern is indicated by 59 degrees +/-5.)

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Point B (B) A measuring point on the anterior profile curvature from the mandibular anthropometric landmark, pogonion, to the crest of the alveolar process; the most depressed area of bone between pogonion and the labial crest of bone at the most labially inclined mandibular central incisor.

Point D (D) A measuring point located in the center of the mandibular symphysis in an antero-posterior relationship.

Porion (P) The midpoint on the upper edge of the external auditory meatus. As a cephalometric landmark, it is located by means of the metal rods of the cephalometer, or by a point directly ten millimeters distal to the most superior point on the head of the bony condyle.

Posterior Nasal Spine (PNS) Process formed by uniting projected ends of the posterior borders of the palatine process of the palatal bones.

Pterygomaxillary (Ptm) The point where the pterygoid process of the sphenoid bone and the pterygoid process of the maxilla form the pterygomaxillary fissure; the anterior border of the greater wing of the sphenoid bone and the posterior border of the maxilla. The lowest point of the opening is used in cephalometrics. (Theoretically, a point located on the posterior-superior aspect of thepterygomaxillary fissure is the point of center of growth of the face and skull. This is termed Ricketts point (Pt).

Sella-Nasion Plane (SN) A plane used in cephalometrics to describe mid-sagittal anterior cranial base, to, which is, related the most anterior borders of the maxillary and mandibular alveolar bases (SNA and SNB).

Sella-Nasion A Point (SNA or Subspinale) Antero- posterior relationship of the maxillary basal arch to the anterior cranial base. This shows the degree of maxillaryprognathism

Sella-Nasion B Point (SNB or Supramentale) Shows the anterior limit of the mandibular basal arch in relation to the anterior cranial base.

Sella Tursica A cephalometric point, commonly called Sella, is located in the middle of the outline of the hypophyseal fossa as seen in the lateral head film; the geometric center of the pituitary fossa of the sphenoid bone; serves as a posterior landmark for Sella-Nasion plane.

SL Measurement SL measurement is a growth indicator and is located by drawing a line perpendicular to Sella Nasion line through pogonion. The length is measured on the SN line in millimeters from Sella point to the intersection of the pogonion perpendicular line. Neutral growth will be 51 mm +/- 5. Less indicated a vertical growth pattern and more indicates a horizontal growth pattern.

SNA-SNB (ANB) The angle formed by Sella-NasionA point (subspinale) and Sella-Nasion B point (supramentale). It indicates antero-posterior relationship of maxillary and mandibular basal arches to the anterior cranial base.

WITS Analysis Conceived primarily as a way to overcome the limitations of ANB as an indicator of jaw discrepancy. It is based on projections of points A and B to the occlusal plane, along which the linear difference between these points is measured. (WITS appraisal was named by Dr. Alex Jacobsen after his alma mater, Witwatersrand University, South Africa, where he popularized it, in assessing anterior-posterior jaw comparisons.

Y-Axis A line connecting the geometric center of theSella Tursica with the Gnathion. This is the vector of downward and forward growth of the face beneath the cranium. There are two Y-axis angles in Cephalometrics; one formed by the intersection of the S-N and Y- axis, and the other that is formed by the intersection of F-H and Y-axis. It is the latter that is most commonly used in cephalometric analysis.

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Basic Diagnosis & Basic Treatment Planning

Basic Course

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Basic Diagnosis & Basic Treatment Planning

We are going to expand our diagnosis & treatment planning discussion to include my entire case work-up cookbook.

This does not mean that I intend that it is ok for beginning doctors to consider treating in these additional categories!

Beginning Diagnosis & Treatment Planning

- In Orthodontics, the diagnosis is the key to success.
- After gathering the necessary information to fill the database, determining the orthodontic classification in the majority of patients is not that hard.
- For the general dentist who is just beginning orthodontics, 70% of the patients that typically are encountered in practice fall into a category of relatively simple cases to diagnose and treatment plan.
- The remaining 30% will be much more difficult to diagnose and classify, therefore, should be referred to specialists until competency and confidence increase.

The Data Base

- Typically, these are the significant components of the Data Base:
- Clinical examination
- Panoramic radiograph
- Lateral Cephalometric radiograph
- Study Models
- Photographs

Clinical Examination

- The patient's Chief Complaint
- Facial esthetics and balance- asymmetry front and profile view, transverse and sagittal.
- Air way assessment- venous pooling under the eyes, nose or mouth breathing, "dry line" on teeth.
- Teeth and Jaws- caries, periodontal disease, TMJ, limited or deviated opening
- Mental, Emotional and Psychological- immature, irresponsible, uncooperative, mentally or psychologically impaired or compromised.

Panoramic Radiograph

- Cuspid and bicuspid apexification
- Dental age
- Third molars
- Congenitally missing/supernumerary teeth
- Impacted/blocked out teeth

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Lateral Cephalometric Analysis

- Chronological Age and Gender-predictor of growth
- Soft tissue profile
- Lower incisor to NB, Pogonion to NB, relationship Lower incisor to AP line
- Skeletal classifications
    - ANB: Skeletal class I, II or III pattern
    - Wits: Apical base Class I, II or III
    - SN-GoGn: neutral, closed or open bite growth pattern
    - Y-axis: (SN-SGn) neutral, counter clockwise & clockwise growth pattern

Study Models

- Dental classification I,II or III
- Curve of Spee
- Centric bite
- Andrews Six Keys of Occlusion

Photographs

- Facials
    - Frontal relaxed
    - Frontal smiling
    - Profile
- Intraoral
    - Frontal (optional frontal incisors end to end)
    - Left lateral and right lateral
    - Maxillary occlusal and mandibular occlusal

Basic Ceph Analysis

- Using the Williams Intro Analysis Forms gives an organized format to pull the diagnosis together, allowing a concise summary.
- Using the Diagnosis Work Sheet, th entire data base is pulled together and the diagnosis is determined. A treatment plan option corresponding to the case type is then selected.
- This treatment plan is placed in the patient’s chart along with the completed diagnostic analysis form.

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Williams *Basic* Cephalometric Analysis

Patient:_____ **Age:**_____ **Date:**_____

Measurement	Value	Norm	Notes
SNA	_____	82° +/- 4°	_____
SNB	_____	80° +/- 4°	_____
ANB	_____	0 to 4°	_____
SN-GoGn	_____	32° +/- 5°	_____
Y axis (SN)	_____	67° +/- 3°	_____
1/1 Angle	_____	131° +/- 4°	_____
U1 to NA°	_____	22° +/- 4°	_____
L1 to NB°	_____	25° +/- 4°	_____
U1 to NA mm	_____	4 +/- 2 mm	_____
L1 to AP line	_____	1 +/- 2 mm	_____
L1 to NB mm	_____	4 +/- 2 mm	_____
Po to NB mm	_____	2 +/- 2 mm	_____
WITS mm	_____	-1 mm +/- 1 mm	_____
E-plane MX lip	_____	0 - +2 mm	_____
E-plane MN lip	_____	0 - +2 mm	_____

Dental Classification (Class I, II, or III) *(determined by model analysis, clinical examination and or photographs)*

Molar Difference	____R ____L	0 mm	+ = II; - = III
Cuspid Difference	____R ____L	0 mm	+ = II; - = III

Skeletal Classification (Class I, II, or III)

ANB	____ °	0 - 4°	> = II; < = III
WITS	____ mm	-1 +/- 1 mm	> = II; < = III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn	____ °	32° +/- 5°	> = Clock; < = Counter
Y Axis (SN)	____ °	67° +/- 3°	> = Clock; < = Counter

Proper Incisor Angulation

1/1 Angle	____ °	131° +/- 4°	> Retrusive; < Protrusive
U1 to NA	____ °	22° +/- 4°	> Protrusive; < Retrusive
L1 to NB	____ °	25° +/- 4°	> Protrusive; < Retrusive

Balanced Face – Esthetic Profile

L1 to AP line	___ mm	1 +/- 2 mm	>= Protrusive; < = Retrusive
U1 to NA	___mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
L1 to NB	___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
Po to NB	___ mm	Varies	
E Plane Mx Lip	___ mm	0 mm +/- 2 mm	< = Concave; > = Convex
E Plane Mn Lip	___ mm	0 mm +/- 2 mm	< = Concave; > = Convex

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Williams Diagnosis Worksheet

Case #: _____ Patient: _____ Date: _____ DOB: _____

Age: _____yr _____mo Sex: _____ Responsible Party: _____

Address: _____ City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Referred By: _____

Ethnic Norm: _____ Dentition: _____ Treatment Stage: _____

CEPHALOMETRIC ANALYSIS

Skeletal Classification (Class I, II, or III)

ANB	____°	0 - 4°	> = II; < = III
WITS	____ mm	-1 +/- 1 mm	> = II; < = III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn	____°	32° +/- 5°	> = Clock; < = Counter
Y Axis (SN)	____°	67° +/- 3°	> = Clock; < = Counter

Proper Incisor Angulation

1/1 Angle	____°	131° +/- 4°	> Retrusive; < Protrusive
U1 to NA	____°	22° +/- 4°	> Protrusive; < Retrusive
L1 to NB	____°	25° +/- 4°	> Protrusive; < Retrusive

Balanced Face – Esthetic Profile

L1 to AP line	___ mm	1 +/- 2 mm	>= Protrusive; < = Retrusive
U1 to NA	___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
L1 to NB	___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
Po to NB	___ mm	Varies	

Study Cast, Photos or Clinical Assessment

___Anterior Crowding	___Anterior Open Bite	___Class I
___Anterior Crossbite	___Anterior Deep Bite	___Class II
___Posterior Crowding	___Posterior Open Bite	Division 1: ____
___Posterior Crossbite	___Posterior Space Loss	Division 2: ____
___Rotated teeth	___Impacted Teeth	___Class III
Curve of Spee:____	Smile Line: ____	

Sim Analysis:

Arch width (difference between projected & actual)

Mx 3's: _____ Mx 6's: _____

Mn 3's _____ Mn 6's: _____

Arch Length Discrepancies mm: (total of 21-23 difference totals)

Mx Arch: _____ Mn Arch:_____

DIAGNOSIS _____

_____

_____

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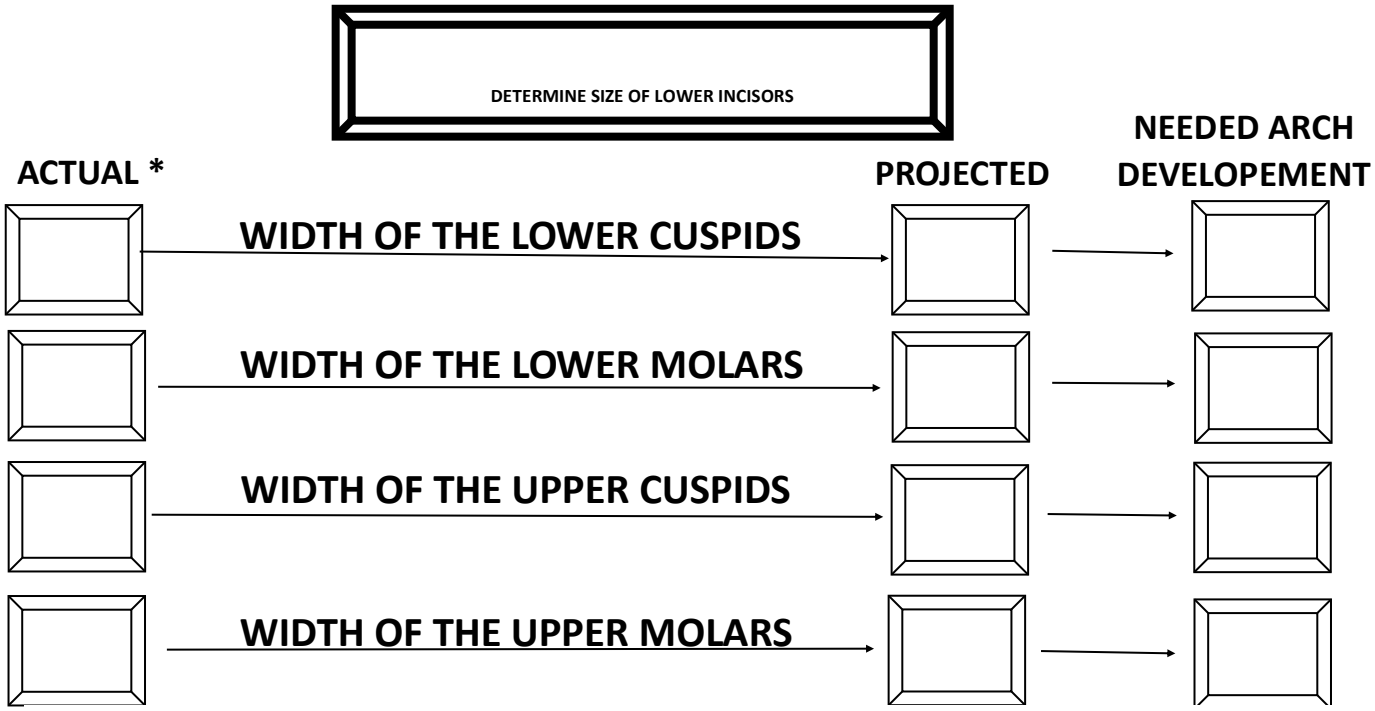
SIM ARCH WIDTH CAST ANALYSIS WORKSHEET



*IF MEASURING PRIMARY CUSPIDS - ADD 4MM TO THE ACTUAL #

*IF MEASURING PRIMARY 2ND MOLARS - ADD 4MM TO THE ACTUAL #

RANGE FOR INCISOR SIZES

SMALL	MEDIUM-SMALL	MEDIUM	MEDIUM-LARGE	LARGE
PROJECTED WIDTH OF THE LOWER CUSPIDS				
30mm	31-32mm	32.5mm	33-34mm	35mm
PROJECTED WIDTH OF THE LOWER MOLARS				
50mm	51mm	52-53mm	54mm	55mm
PROJECTED WIDTH OF THE UPPER CUSPIDS				
38mm	39mm	40-41mm	42mm	43mm
PROJECTED WIDTH OF THE UPPER MOLARS				
54mm	55mm	56-57mm	58mm	59mm

Formula allows for 2mm of post treatment relapse

SAGGITAL "BUCCAL SEGMENT" SPACE PREDICTION "21-23 Rule"

Measure the distance distal of the lateral incisor to the mesial of the 1st molar. 21mm in each of the lower segments and 23mm in the upper segments is required for the 3, 4 & 5. In races with larger teeth, such as Black and Hispanic, use 23-25 Rule.

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Treatment Planning Overview

- Choose one of the 7 treatment plan options that fits the diagnosis. This treatment plan will allow the correction of the mixed dentition problem in early intervention cases, or it will allow the establishment of the lower arch in comprehensive cases.
- Once the lower arch needs are considered, the wire series is applied, working up through the .018x.025 stainless steel arch wire.
- Next, the upper arch is manipulated over the lower arch in such a way that the U6s mesial buccal cusps are positioned over the L6s buccal grooves and the upper first and second premolars are in the embrasures of the lower premolars.
- All the remaining spaces in the anterior segments are then closed, if any space has been created from the previous work.
- Cross arch elastics and sectionals are employed to "sock in" the premolars.
- Finally, the case is stripped and a Vacuum form, Begg, Hawley or QCM retainer is delivered as well as a lower bonded 3x3 retainer.
- Retention forever!

Phase I vs Phase II

Definitions

Phase I: Early orthodontic treatment in the primary or mixed dentition that will finish before all the primary teeth exfoliate and/or before the 28 permanent teeth arrive.

Phase II: Comprehensive orthodontic treatment in the mixed or permanent dentition that will finish with the permanent dentition arranged to reflect the Andrew's six keys to occlusion.

Note Regarding Phase I vs Phase II:

- Phase I can occasionally make Phase II unnecessary (but not often).
- A Phase I case, if started late or if it runs long, may overlap into Phase II treatment. (This needs to be anticipated and discussed, if possible, but regardless, the finances need to be addressed and handled as soon as possible to avoid confusion and conflict.)
- Often a case may not require an early start. In these situations, treatment would be Phase II only, even if the case starts in UAWs.

Establishment of the Lower Arch

The lower arch is always the diagnostic arch. Establishing the lower arch means anticipation of **LEVELING, ALIGNING, AND ROTATING** all teeth that are available in the lower arch, including second molars if possible. You must decide and determine based on the diagnostic observations of the lower arch, which includes the position of the lower incisors, premolars, and molars, what treatment plan is necessary to fit the maxillary teeth on the lower arch.

Depending on the age and stage of development, this may simply be a typical Phase I treatment which would involve:

1. Regaining space from early tooth loss, or holding the "E" space (In a mixed dentition and transverse/sagittal appliances if needed)
2. It might include early re-posturing of the mandible or bringing the maxilla forward.

To "establish the lower arch" may require a typical Phase II treatment in which the lower arch is established as the upper arch is developed, which would involve:

1. Bracketing the teeth and following an archwire sequence (Transverse Appliances, if needed)
2. An upper distalization appliance in conjunction with a straight wire series
3. A lower distalization appliance in conjunction with a straight wire series
4. A reposturing appliance in conjunction with a straight wire series

However, "establishing the lower arch" may require a more complex Phase II treatment in order to protect the lower incisor/pogonion complex, which would involve:

1. Pre-distalizing the lower arch
2. Extraction Mechanics (IPR occasionally)

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What do we mean when we say, "establish the lower arch, the lower arch is the diagnostic arch?"

- It means that all that data-gathering and diagnosis is aimed at helping the dentist in determining/deciding the position that all the lower teeth are to be and then treatment planning how to put them there and place the upper teeth on top of them.
- It doesn't mean that the lower arch has to be treated first or independently, but it does mean that the leveling, aligning and rotating of the lower teeth has to be considered first and foremost.
- So, when we consider doing any orthodontics on a given patient, we are deciding during the diagnostic stage where the lower incisors are as well as the rest of the lower teeth and the mandible, and we pick our treatment to establish that lower arch foundation.
- Of course, this allows the dentist to then choose a treatment path that will hopefully achieve Andrew's Six Keys to Occlusion, the ultimate goal.

Phase I

Occurs in Primary/Mixed Dentition

Definition:

Early orthodontic treatment in the primary or mixed dentition that will finish before all the primary teeth exfoliate and/or before the 28 permanent teeth arrive.

Phase I Treatment Plans

Scenario A

Place utility archwires and/or transverse/sagittal appliances, to recreate the "E" space, or simply hold the "E" space if adequate with a fixed removable lingual arch to utilize the "E" space. Evaluate patient for phase II every six months. Remove FRLA when permanent teeth erupt and begin Phase II, if needed.

Scenario B

Place larger utility archwires with bite jumping appliances, holding the "E" space, correcting the malocclusion as well as the jaw positions. Evaluate patient for Phase II every six months. Remove FRLA when permanent teeth erupt and begin Phase II, if needed.

Indications for Phase I Treatment (Scenario A or B)

- Mixed Dentition with transverse and/or sagittal issues
- Late Mixed Dentition with transverse and/or sagittal issues.
- Malposed anterior teeth and crowding
- Deep anterior bite
- Rotated molars
- Esthetic issues
- To minimize or alleviate the need for Phase II

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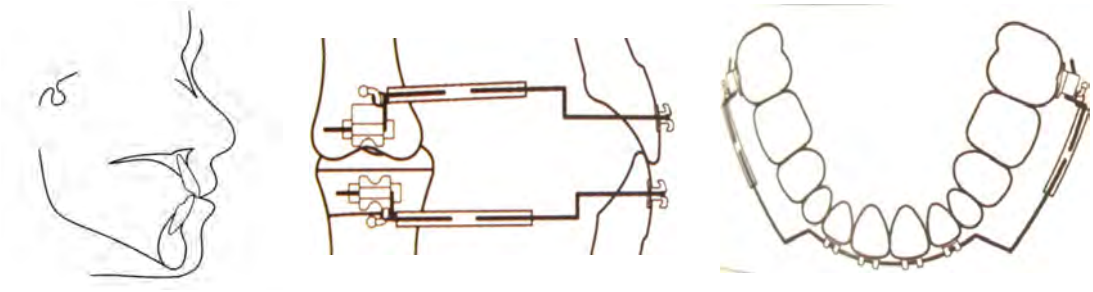
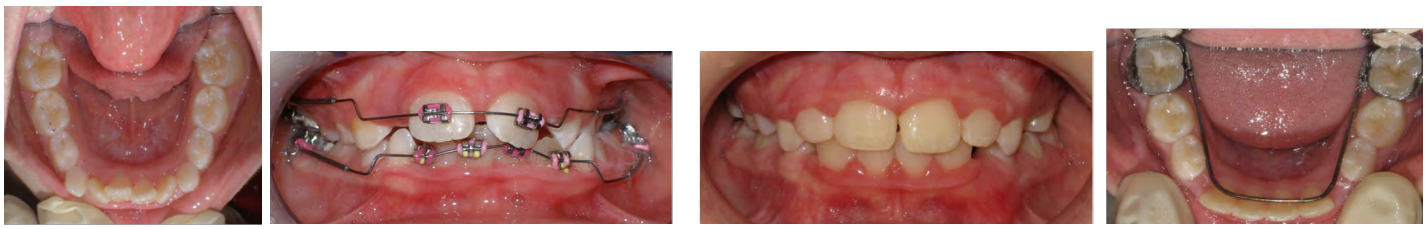
Diagrams of the UAW system used in a typical Phase I treatment.



Photographs of the UAW System

Phase I Scenario A Example Case: (Repositioning of the teeth)

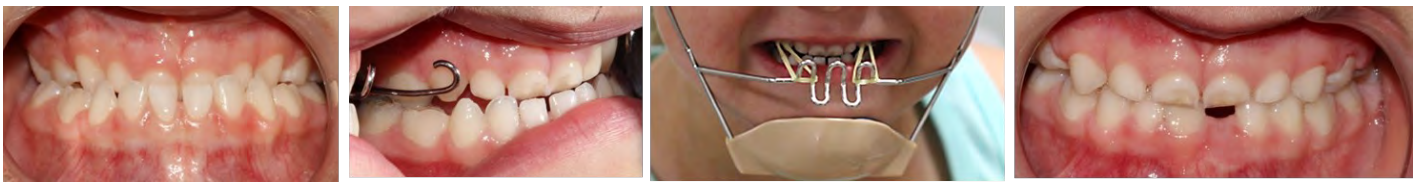
- Mixed Dentition– with Utility Arch Wires & FRLA Retention



Phase I Scenario B Example Cases: (Repositioning of the dentures)

- Mixed Dentition– with Utility Arch Wires, Bite Jumping Appliance & FRLA (not shown)

- Primary Dentition– RVFM, without UAWs*



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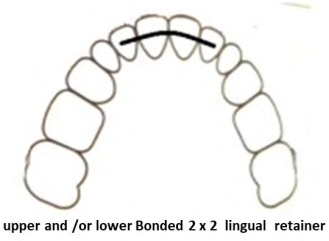
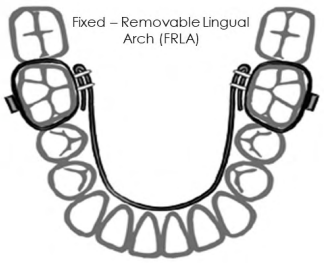
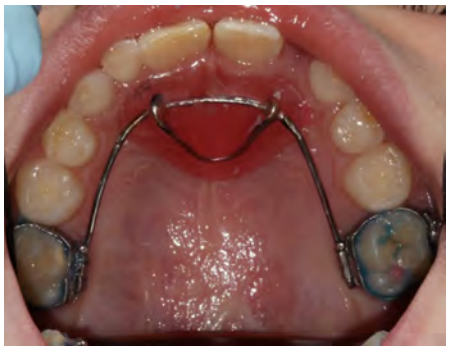
Post Phase I Retention– Applies to Both Scenarios



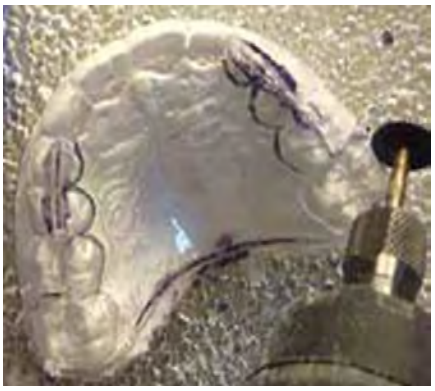


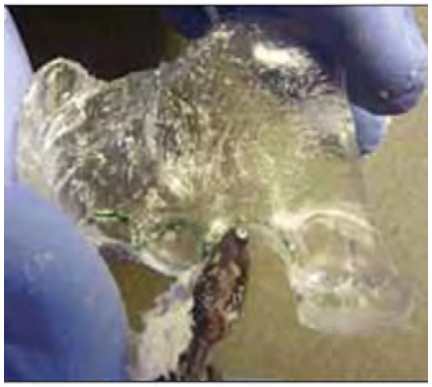
In-Office Nance Button Holding Arch



Lab-Fab Nance Button Holding Arch

The Modified Theroux Phase I Retainer





How it is made:

- Wheel saw used to cut material off cast.
- Acrylic bur used to trim appliance.
- Final appliance made from clear Splint Biocryl.

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Just as the Phase I treatment has two basic plans, two scenarios, so the Phase II treatment plans can be divided into two broad groups or scenarios as well.

Phase II:
Occurs in Late Mixed/Permanent Dentition

Definition:
Comprehensive therapy to arrange the teeth according to the Andrew's Six Keys to Occlusion

Indications for Phase II Treatment can be subdivided into two basic scenarios. These two situations divide the treatment plan options into categories; Scenario A & B:

Scenario A: (includes Williams Treatment Plans 1, 2 & 3)

1. Concave to Normal Profile
2. Permanent or Late Mixed Dentition
3. Incisors can come forward
4. Mild to Moderate Crowding (possibly with transverse and/or slight sagittal issues)

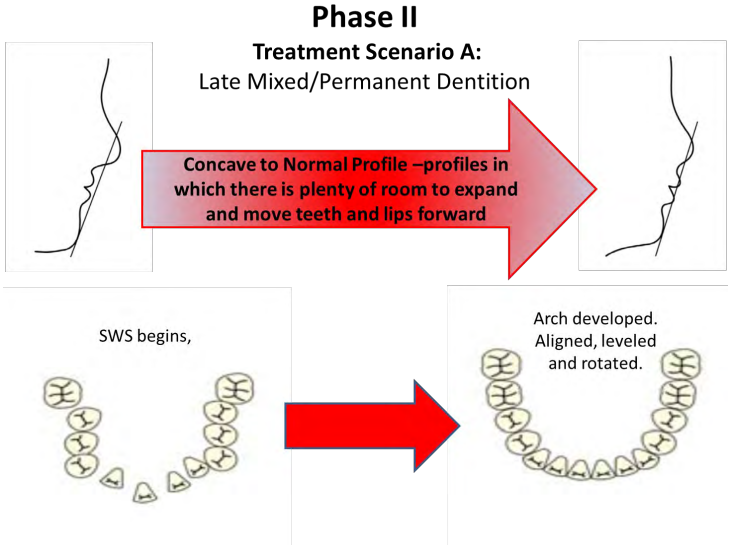
Scenario B: (includes Williams Treatment Plans 4 & Extraction)

1. Full Profile (protrusion, bimaxillary protrusion, little/no pogonion and no potential for growth)
2. Mild to Moderate Crowding (possibly with transverse and/or slight sagittal issues)
3. Incisors cannot come forward
4. Permanent or Late Mixed Dentition

Phase II

Treatment Scenario A: Late Mixed/Permanent Dentition (This subdivision includes Williams Treatment Plans 1, 2 & 3)

1. Bracketing with straight wire sequence (Utility arch wires and/or straight wire series
2. Transverse/Sagittal Arch Developing Appliances if needed



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Phase II

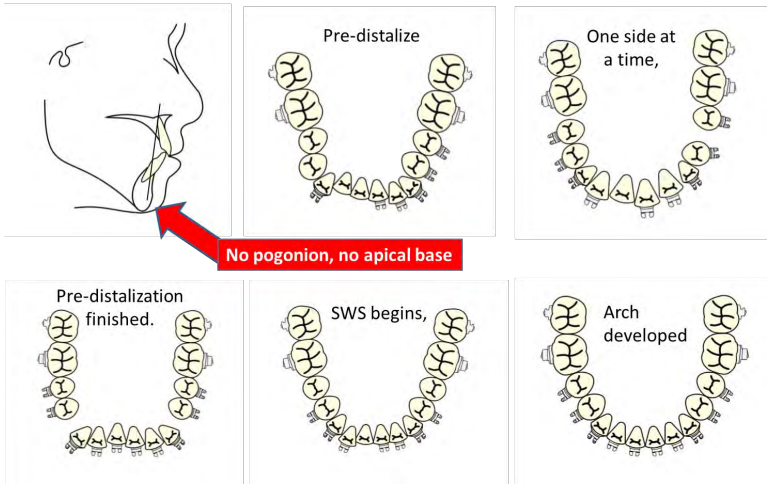
Treatment Scenario B: Late Mixed/Permanent Dentition (This subdivision includes Williams Treatment Plans 4 and Extraction)

1. Pre-Distalization or Extraction
2. Bracketing with straight wire sequence
3. Transverse Appliances if needed
4. Lower Distalization if needed
5. Upper Distalization if needed

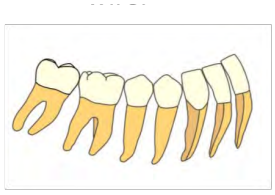
Indications for Phase II Treatment Scenario B:

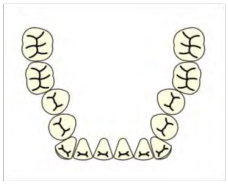
1. Full Profile (protrusion, bimaxillary protrusion, little/no pogonion and no potential for growth)
2. Mild to Moderate Crowding (possibly with transverse and/or slight sagittal issues)
3. Incisors cannot come forward
4. Permanent or Late Mixed Dentition

Full Profile



Establish the lower arch with a wire series (level, align, and rotate), progressing from a light round archwire until the brackets eventually accept an .018 x .025 stainless steel arch wire.

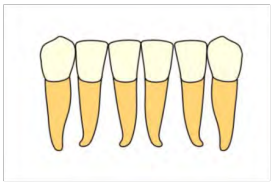

Deep Curve of Spee


Arch Constrictions/Rotations


Anterior Irregularities


Curve of Spee Leveled


Arch Aligned and Rotated


Anterior Teeth Leveled

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NOTE:

- Employing these methods to establish the lower arch obviously is closely tied into the esthetic plane as well as genetic ethnicity.
- In a concave or flat profile for example, one may decide to advance the anterior teeth to achieve more lip support.
- In some races, procumbency is norm, so finishing full is desired.
- Other races where a procumbent profile is undesirable, one would obviously distalize the posterior teeth for maximum esthetic effects.

Treatment Plans:

- After you have decided where to place the lower incisors and how to establish the lower arch, considering all these general options, you then must develop a full treatment plan and make it a permanent record in your patient's chart.
- The following are treatment plans. They are by no means the only options. They are a general rule of thumb which I follow in my office.

Mixed Dentition- Utility Archwires Phase I Treatment Plan:

- Full Standard of Care Records
- Sagittal/Transverse Appliances, if needed (Determined by the Sim Analysis)
- .018 NT Prefab. UAW (badly malposed teeth)……1-2 months
- .016 x .016 NT Prefab UAW (Minor malposed)……1-2 months
- .016 x .016 SS Prefab UAW (Tip - backs; Toe - ins; Advance)……6 months
- FRLA ……Until Phase II
  (Until premolars erupting)

Phase I UTW without Appliances Treatment A

- Just UTW

Phase I UTW with Appliances Treatment B

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Phase II

Comprehensive treatment plans that finish to Andrew's Six Keys of Occlusion in permanent dentition.

SWS Treatment Plan 1: Class I

When the lower incisors **can** be brought forward, if they **can't,** see Treatment Plan 4

- Full Standard of Care Records
- .012 (.014) Nitinol…….. 1 -2 months (Comp. Pads)
- .014 Nitinol (RW)…….1- 4 months or until rotations are out
- .018 Nitinol……1 month
- .020 Stainless Steel (AC/RC CB, if needed)……..1 – 4 months or until bite open and/or:
  (Step-ins/outs; OCS/stops)
- .016 x .022 Nitinol……1month
  (**Take Pan and rebracket any teeth if needed**)
- .016 x .022 Stainless Steel ……1 month
- .018 x .025 Stainless Steel ……3 months
- Cross arch elastics and sectionals……2wks – 1 month
  (Until premolars fully intercuspated)
- Remove posterior bands/brackets –impress for retainers …… 2wks – 1 month
- Remove sectionals – QCM/Bonded lower 3x3…….. 2 wks –1 month
- Check in one week, retention forever

NOTE: If it is a late mixed dentition, one may place prefabricated utility archwires until the premolar/canines erupt, and then bracket them, and follow the wire series above.

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SWS Treatment Plan 2: Class II

When the lower incisors **can** be brought forward, if they **can't,** see Treatment Plan 4

- Full Standard of Care Records
- .012 (.014) Nitinol……. 1 month (Comp. Pads)
- .014 Nitinol (RW)…….1- 4 months or until rotations are out
- .018 Nitinol……1 month
- .020 Stainless Steel (AC/RC CB, if needed)……..1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
- .016 x .022 Nitinol……1month (**Take Pan and rebracket any teeth if needed**)
- .016 x .022 Stainless Steel ……1 month
- MDA/.018 x .025 Stainles……Until over distalized 6-8mm
- Retract Premolars on .016 x .022 Stainless Steel (AC-BRT)……2-3 months**** (Until premolars fully intercuspated)
- Retract Canines on .016 x .022 Stainless Steel (AC-BRT)……2-3 months
- Retract Anterior Teeth with .018 x .025 posted SS (AC-BRT)……..2-3 months
- .018 x .025 Stainless Steel ……3 months
- Cross arch elastics and sectionals……2wks – 1 month (Until premolars fully intercuspated)
- Remove posterior bands/brackets –impress for retainers …… 2wks – 1 month
- Remove sectionals – QCM/Bonded lower 3x3…….. 2 wks –1 month
- Check in one week, retention forever

****Often after removal of the MDA, the teeth are not totally aligned. Therefore prior to placing the .016 x .022 SS immediately after removing the MDA, one must place .018 Niti for two weeks followed by .020 SS for two weeks, and then progress to the .016 x .022 SS.

NOTES ON TREATMENT PLAN 2:

- Other Distalization appliances (such as the Carrier Distalizer – Henry Schein) may be placed at the beginning of treatment to distalize the molars in lieu of the MDA – after distalization is attained, the straight wire series may be followed as in treatment plan 1.
- ALSO, If the Mandible is Retrognathic and the Maxilla Prognathic, one may opt to employ a straight wire series as in Treatment Plan 1, only then placing a .019 x .025 stainless steel archwire in both arches, bending the distal ends of the archwires distal to the second molars, placing a lower lingual arch, and placing as reposturing appliance (such as the Twin Force bite corrector – Henry Schein).

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SWS Treatment Plan 3: Class III and some Class I

When the lower incisors **can** be brought forward or are forward already

- Full Standard of Care Records
- .012 (.014) Nitinol…….. 1 month (Comp. Pads)
- .014 Nitinol (RW)…….1- 4 months or until rotations are out
- .018 Nitinol……1 month
- .020 Stainless Steel (AC/RC CB, if needed)…….....1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
- .016 x .022 Nitinol……1month (**Take Pan and rebracket any teeth if needed**)
- .016 x .022 Stainless Steel ……1 month
- .018 x .025 Stainless/Lower MDA……Until over distalized 4mm
- Retract Premolars on .016 x .022 Stainless Steel (AC-BRT)……..2-3 months
- Retract Canines on .016 x .022 Stainless Steel (AC-BRT)…….2-3 months****
- .018 x .025 SS/posted .018 x .025 SS power chain or spring…….2-3 months
- Cross arch elastics and sectionals…….2wks – 1 month (Until premolars fully intercuspated)
- Remove posterior bands/brackets –impress for retainers …… 2wks – 1 month
- Remove sectionals – QCM/Bonded lower 3x3…….. 2 wks –1 month
- Check in one week, retention forever

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SWS Treatment Plan 4: Class I, II & III

When the lower incisors **cannot** be brought forward

Full Standard of Care Records

LOWER

CD Distalizer Initially (EZ distalizer)……2 – 6 months (Until over distalize 6mm) ****

(No Brackets on anteriors until distalization complete)

Remove CD Distalizer, and bracket lower teeth

(It is sometimes desirable to place a lingual arch to increase anchorage on the molars)

Follow Williams wire series (as in Treatment Plan I)

Work up to a .016 x .022 SS……..2 – 3months

(Retract lower premolars and canines with power chain/closed coil springs).

.18 x .25 SS/posted .18 x .25 SS power chain or springs)……..2 – 3 months

****Often after removal of the Appliance, the teeth are not totally aligned. Therefore prior to placing the .016 x .022 SS immediately after removing the distalizer appliance, one must place .018 Niti for two weeks followed by .020 SS for two weeks, and then progress to the .016 x .022 SS.

UPPER

Bracket/band all upper teeth and follow Williams wire series at same time as placement of lower CD Distalizer

.014 Nitinol (RW) (Upper)……1 – 4 months or until rotations are out

.018 Nitinol (U/L)……..1 month

.020 Stainless Steel AC/RC CB……..1 – 4 months

(or until bite open and/or Step-ins/outs; OCS/stops)

.016 x .022 Nitinol……..1 month

(Take Pan and rebracket any teeth if needed)

.016 x .022 Stainless Steel……..1 month

MDA/.018 x .025 Stainless Steel (Upper - If necessary)……..2 – 6 months

(Until Over distalize 6 mm)

Retract Premolars on .016 x.022 SS (AC-BRT) …….. 1 month****

***Often after removal of the MDA, the teeth are not totally aligned. Therefore prior to placing the .016 x .022 SS immediately after removing the MDA, one must place .018 Niti for two weeks followed by .020 SS for two weeks, and then progress to the .016 x .022 SS.

Retract Canines on .016 x .022 SS (AC-BRT)……..1 month

.18 x .25 SS/posted .18 x .25 SS power chain or springs) (AC-BRT)……..1 month

(If MDA not necessary, 018 x .025 SS)……..3 months

Cross arch elastics and sectionals……..2 wks – 1 month

(Until premolars fully intercuspated)

Remove posterior bands/brackets –impress for retainers……..2 wks-1 month

Remove sectionals – QCM/Bonded lower 3x3……..2 wks-1 month

Check in one week, retention forever

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Extraction Orthodontics:

This basic course is **not** an extraction course and it is recommended extraction cases be referred. Non-extraction orthodontics is reversible. Extraction orthodontics is a permanent alteration of the dentition. With the above said, patients who may be considered extraction cases are:

- Dolicocephalic patients who need lower distalization
- Dolicocephalic patients who are very procumbent
- Full Step Class II Patients
- Certain non-compliant patients
- Severe crowded Cases
- Cases which extracting the teeth will not affect the Esthetic Plane in a negative manner

SWS Treatment for Extraction Cases:

- Full Standard of Care Records
- .012 (.014) Nitinol…….. 1 -2 months (Comp. Pads)
- .014 Nitinol (RW)……..1- 4 months or until rotations are out
- .018 Nitinol……1 month
- .020 Stainless Steel (AC/RC CB, if needed)……..1 – 4 months or until bite open and/or:
  (Step-ins/outs; OCS/stops)
- .016 x .022 Nitinol……1month
  (**Take Pan and rebracket any teeth if needed**)
- .016 x .022 Stainless Steel (Power Chain/Closing Springs 6-6)……Until Spaces Closed
  Class II and /or Class III Elastics (as needed) (AC/RC if needed)
- .018 x .025 Stainless Steel (Power Chain)……3 months
  Class II and /or Class III Elastics (as needed) (AC/RC if needed)
- Cross arch elastics and sectionals……2wks – 1 month
  (Until premolars fully intercuspated)
- Remove posterior bands/brackets –impress for retainers …… 2wks – 1 month
- Remove sectionals – QCM/Bonded lower 3x3…….. 2 wks –1 month
- Check in one week, retention forever

NOTE: Treat all cases nine months to one year non-extraction- extraction orthodontics creates permanent change.

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Multi-Distalizing Arch (MDA) Appliance

Williams' Instructions

Basic Course

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Multi-Distalizing Arch

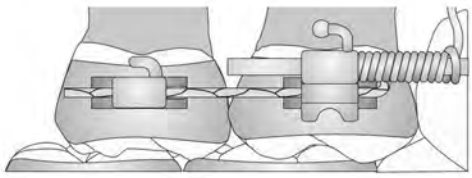
THE MULTI ARCH DISTALIZING APPLIANCE

Purpose: to bodily distal drive molar teeth

- Unilateral or bilateral
- For the maxilla or mandible
- One attains a component distalization of the premaxilla as the molars distalize.
- One attains a component of mandibular repositioning due to the elastic wear.

Use of the MDA Appliance for Distalization of Maxillary Molars

- In order to obtain optimal results using the MDA appliance, there are certain guidelines that must be followed to prevent adverse effects.
- The following treatment sequence is a brief treatment outline to follow, per my office.
    1. Band all first and second molars upper and lower that are present.
    2. Bracket all available teeth upper and lower.
    3. Do not bracket teeth that cannot be incorporated into the arch such as blocked out cuspids.
    4. Progress through the routine Williams arch wire sequence.
    5. The lower (anchorage) arch must be in a minimum of .018 x .025 stainless steel arch wire before starting the MDA appliance.
    6. Position of the second molars on the upper arch is important. If the second molars are erupted into the arch, they should be banded and incorporated in the archwire sequence so that a segmental wire can be placed prior to MDA activation.
    7. Upper arch should be in at least .016 x .022 stainless steel prior to placement of the MDA.



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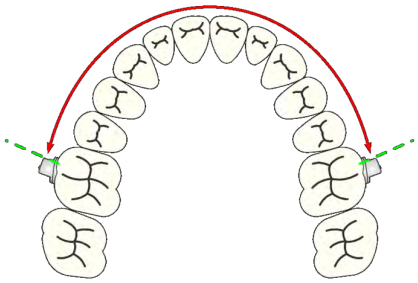
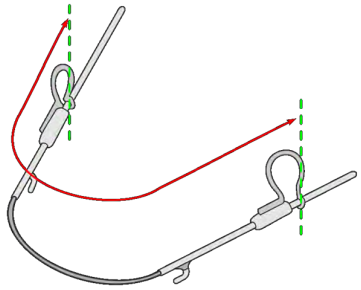
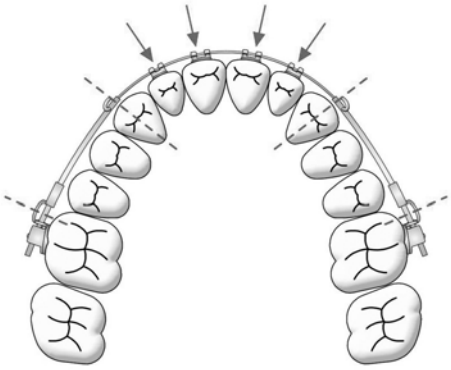
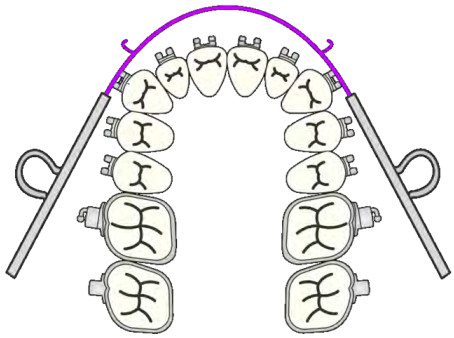
- Arch size is determined by measuring mesial of the headgear tube on the first molar band on one side to the headgear tube on the other side.
- This can best be done by using a wax bite pattern or the flexi-ruler supplied with the appliance kit.



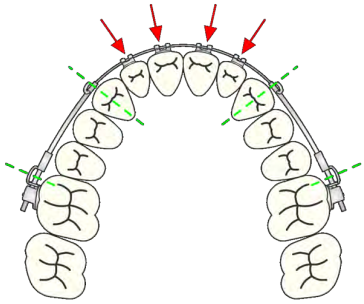


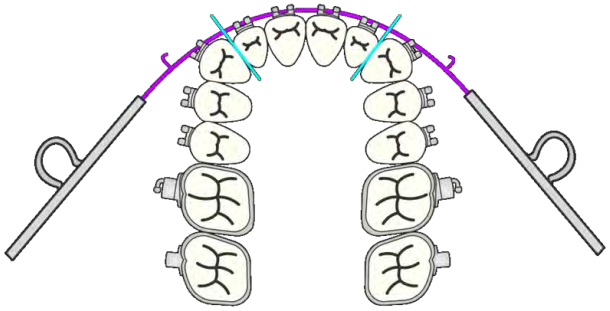




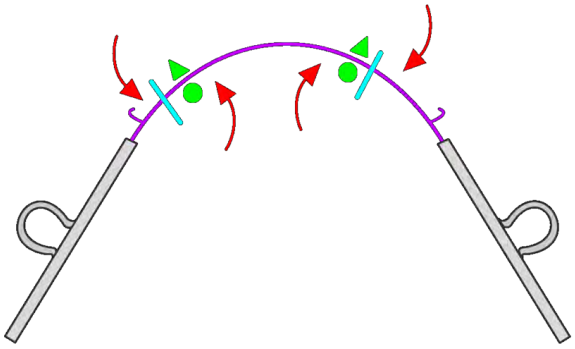
- Utilizing the wax bite, select an MDA appliance that is adequate in size.
- MDA will extend out the back of both headgear tubes.

- Using a wax bite pattern, it will be necessary to adapt the appliance to fit passively for each individual's arch.
- Begin by placing cuspid eminence bends in the anterior portion of the appliance.





- Contour the anterior portion of the MDA appliance to fit the four incisors.
- Cuspid eminence bends are often required.
- Mark the wire distal to each lateral incisor.



- Place the light wire pliers on the mark on the right side. Push the anterior portion of the appliance OUT.
- Move the tips of the pliers 1mm distal and push the posterior portion of the appliance IN.

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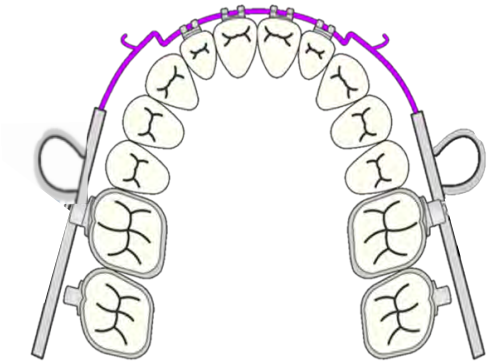
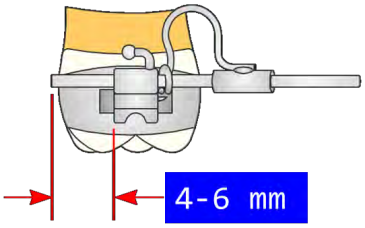
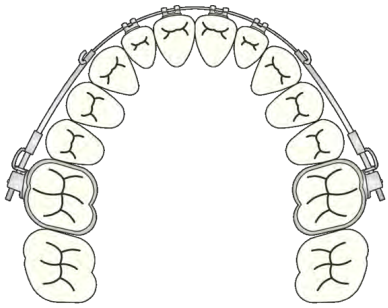
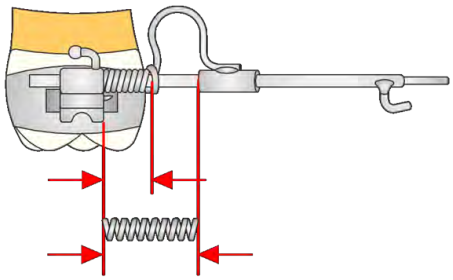


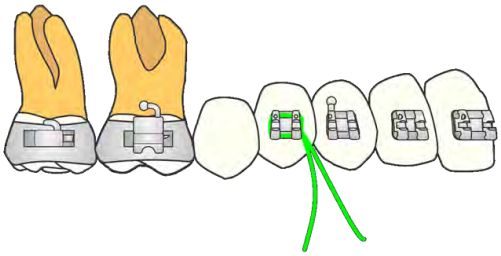
- The adapted MDA appliance should fit the wax bite passively in the four incisors and lie just to the outside of the headgear tubes on each side





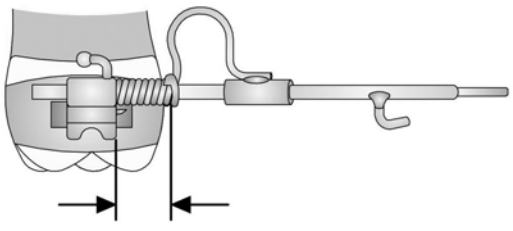
- Insert the appliance into the patient's mouth in the headgear tubes and check the arch for proper adaptation.
- It should fit passively into the four incisors, bypass the cuspids and bicuspids, and engage into the headgear tubes without resistance.
- The arch wire should extend distal to the headgear tube so that the molar will have enough wire length to be distalized.





- If necessary, remove the second premolar brackets as they interfere with the appliance.
- Before placing the appliance, tie an .012 long ligature on the first premolar brackets, leaving the ends long extending beyond the lips.
- Place a 6mm segment of .010 x .045 nitanium open coil spring between the movable leg of the omega loop and the mesial of the molar headgear tube.
- Close the omega loop to allow for maximum future activation.

.010 x .045
Open Coil Spring
(OCS)



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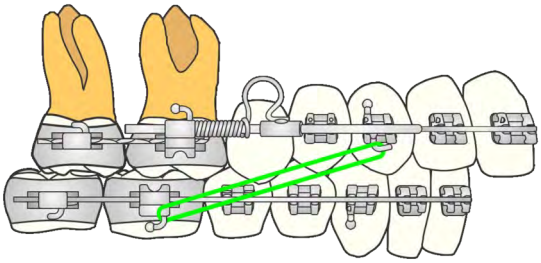
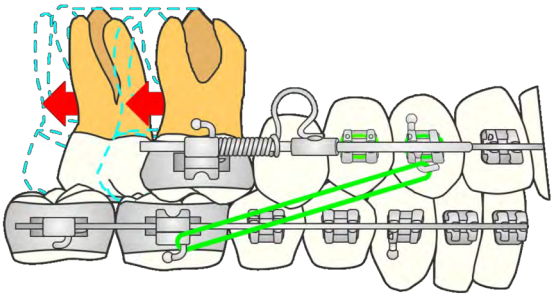
- Seat the appliance with coil springs and ligate the four incisors.
- Using the free ends of the ligature wires on the first bicuspids, tie to the hooks on the MDA. This will be additional support.
- One may also tie a ligature wire over the MDA to the cuspid brackets. This wire does not engage into the cuspid bracket slot but rather lies on top and is passively ligated for additional anchorage.



- Place an .010 metal ligature on the distal tie wing of the lateral incisors for additional anchorage
- Place a four unit power chain on the upper four incisors.
- Place 1– 1/4" extra heavy elastic per side and instruct the patient to wear them.
- Schedule the patient in three weeks.

Illustration depicts ELASTIC wear

One extra heavy elastic per side - 24/7 - Total Patient Compliance Needed



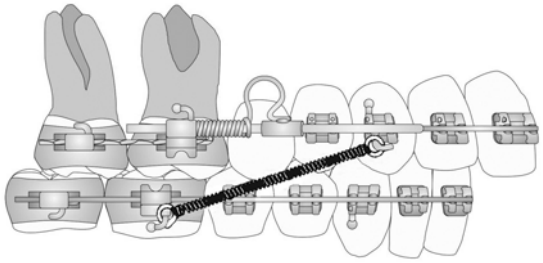
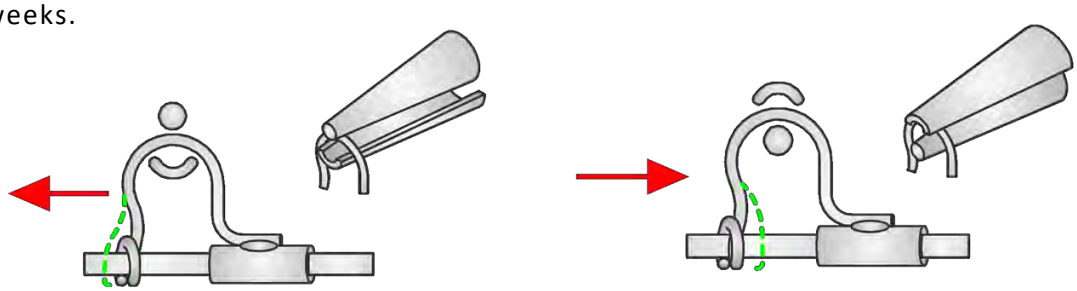


Illustration depicts NITI VARIABLE FORCE SPRING

For non-compliant patients who do NOT wear their elastics. This spring provides 350 grams of force.

- Reinforce the importance of the elastic wear and the three week follow up visit.
- Also enforce to the patient to wear the elastics until you see them next, even if it is longer than three weeks.



- On the return visits, it will be necessary to activate the omega so that it will compress the coil spring again.
- This can be done by using an optical loop plier and compressing the top of the omega until the distal leg of the omega compresses the open coil spring.
- Any flat on flat plier can be used to adjust the omega loop.

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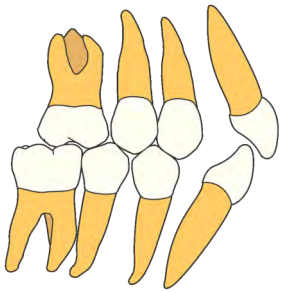
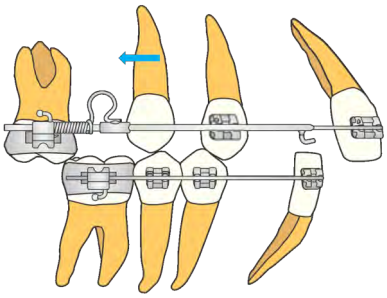
Distalization Technique Using the MDA Appliance

- The most important point to be emphasized when using the MDA appliance is ANCHORAGE. Achieve this by ligating the 2nd premolars to the MDA hooks, chaining the lateral and central incisors to the MDA labial bow and Class II elastics to engage the entire lower arch.



Full Class II Dental

- There is always the possibility of some rebound of the molars during the post-MDA retraction period. If this is a concern, over-distalize. This is especially true when there is a full step Class II dental situation present at the beginning of treatment.
- When over-distalizing, move the upper molars to the point that the mesial marginal ridge of the upper first molar is in contact with the distal marginal ridge of the lower first molar.
- The position of the first and second premolars will vary from patient to patient. Sometimes the teeth seem to translate distally more so than at other times so the amount of retraction necessary will also vary.



- Do not remove the MDA until the upper second premolars start up the mesial incline of the lower first molars. If the patient is a good elastic wearer, these premolars will likely drift along with the molars. If they do, this is an added benefit.
- There will be cases where one side will be completed before the other.
- When you have established the desired relationship on one side, discontinue the activation on that side and continue to activate the other until you have attained this relationship.
- Such would be the case of a unilateral MDA or where the patient is more Class II on one side.
- The position of the anterior teeth and the amount of overjet present will also vary. This is most often attributed to how well the patient has worn their elastics and the amount of force used to activate the appliance.
- Usually, the second premolars will drift distally into the embrasures by the force of the transeptal ligaments. When this occurs, no retraction of the second premolars is necessary.
- Once the molars are distalized into the desired position it will be necessary to begin retraction of the remaining teeth.
- Sufficient anchorage must be employed during this retraction to insure that the molars do not move mesially.
- **The sequence for this retraction phase should be as follows:**
  1. Remove the MDA
  2. Re-bracket the upper second premolars.
  3. Place the largest arch wire possible. Usually the second premolars (previously de-bracketed to allow MDA placement), have drifted away from the other teeth during distalization, so that after re-bracketing, it is impossible to place the .016 x .022 SS arch wire.
  4. Subsequently, a flexible wire is used to bring the 2nd premolars back into the arch (.018 or .016 x .022 nitinol). This should occur within 3 weeks, which is the same interval the patients are accustom during MDA checks.
  5. Continue one Class II ¼" medium elastic per side while getting to the .016 x .022 SS as soon as possible.
  6. Place the .016 x .022 SS arch wire with stops just mesial to the molar tubes and crimpable hooks between the 2's and 3's, continue one Class II ¼" medium elastic per side. (This dramatically increases the anchorage while moving the 5's, 4's & 3's back to the 6's, preventing the mesial migration of the 6's).
  7. Illustrated in the following two diagrams:

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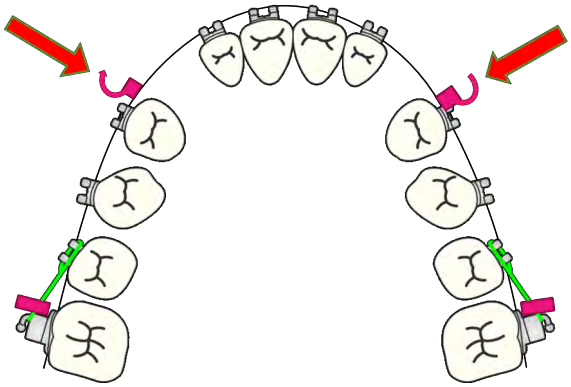
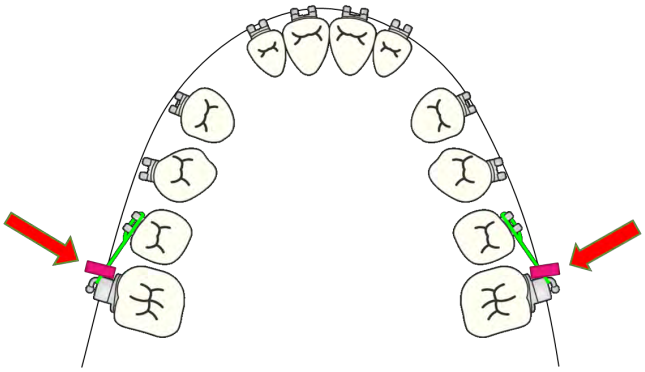
- Crimp Stops on the .016 x.022 ss wire, just mesial to the UR6 & UL6 molar tubes.
- Place power chain from the 2nd molar to 2nd premolars (unless the 7's aren't present, then use the 6's)
- Continue Class II elastics.

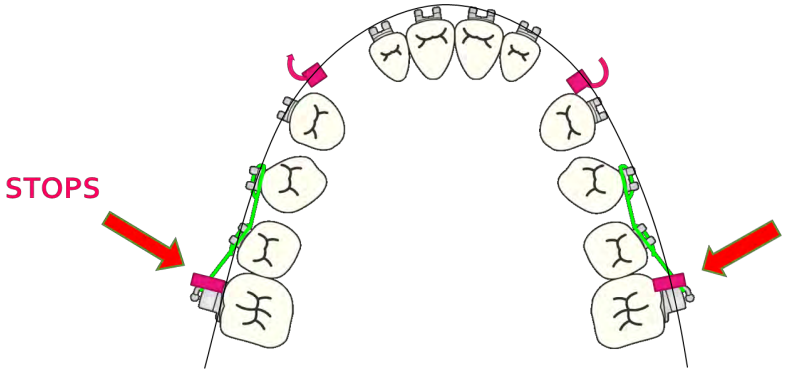




- Place Crimpable Hooks on the .016 x .022 wire, just mesial to the canines.
- Using Class II elastics on these will actively hold back the molars while distalizing the 5's, 4's & 3's.

- In most cases but especially full step Class II's in which anchorage is crucial and there is quite a bit of retraction to be done, patient must continue Class II elastic wear, using crimpable hooks on the AW.
- If the continual use of Class II elastics is creating potential for lingual roll of the lower molars, a FRLA may be placed for additional anchorage at any point in the MDA/Post-MDA retraction sequence.

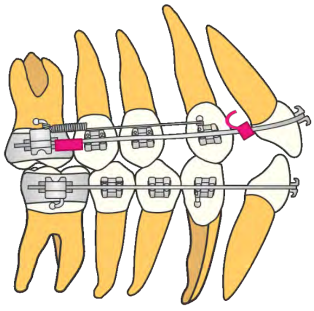
- Once the second premolars are retracted into contact with the molars and locked in the embrasure, begin to retract the first premolar.
- It is done in the same manner. Extend the power chain from the molar up to the first premolar.



- Once the 1st and 2nd premolars are completely distalized (all spaces between 6's, 5's, 4's are closed), retraction of the cuspids commences..
- The 3's can be retracted using power chain, nitinol closed coil springs or Pletcher springs.

Stops on the wire mesial to the molar tubes
Hooks on the wire mesial to the canine

Illustration depicts PLETCHER SPRING, add POWER CHAIN simultaneously to create more force, if needed



CONSTANT FORCE NITI SPRINGS can be used instead of fabricating Pletcher Springs Multiple forces available.

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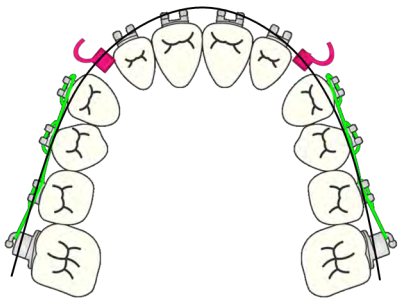
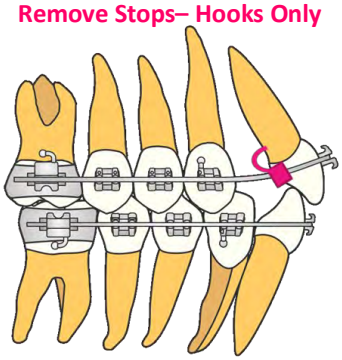
Occlusal view of complete posterior retraction.



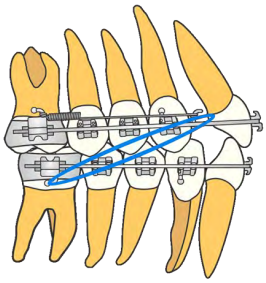
Remove Stops– Hooks Only

Posterior retraction complete and maxillary archwire sequence begins.

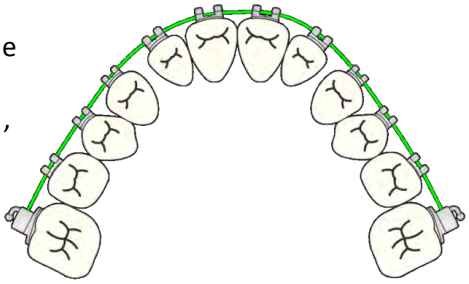


- Once the cuspids have been retracted into their proper position, the anterior retraction commences.
- The anterior retraction is accomplished using springs (nitinol or Pletcher) to an archwire with posts or hooks placed distal to the lateral incisors.
- Remove the aw with stops and hooks, place .016 x.022 ss with hooks and NO STOPS which allows the wire to slide thru the molar tubes.
- Progress to a posted .018 x .025 ss archwire (or crimpable hooks) that has NO STOPS to allow the wire to slide thru the molar tubes.
- Support this anterior retraction with Class II elastics, one ¼" medium elastic per side from the lower 6's to the post/hooks.
- Class II elastics are worn throughout the retraction process to keep the Class I molars intact.

Pletcher springs to a posted archwire (.018 x .025) for anterior retraction when there is significant space to close



When little space is left after posterior retraction, a simple Power Chain can be used 6-6



Straight Arch Wire

- In finalizing the upper arch, it will be necessary to place AC in the wire which increases the lingual root torque on the four incisors.
- Using an .018 x .025 arch wire, place a compensating curve in this wire distal of the cuspid area back through the end of the arch wire.

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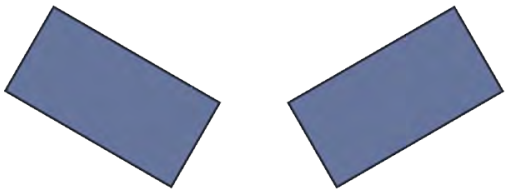
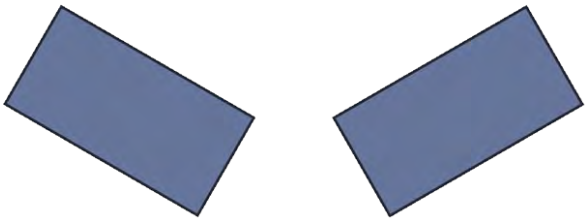
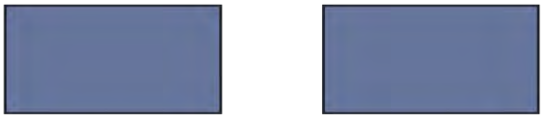


Archwire with compensating curve before detorquing

- The amount of curve placed is determined by the amount of bite opening and torque needed.
- By placing curvature in this size rectangular wire, it will cause the posterior segments of the wire to roll to the lingual and cause the undesired effect of lingual root torque of the posterior teeth.
- This is corrected by de-torquing the archwire.

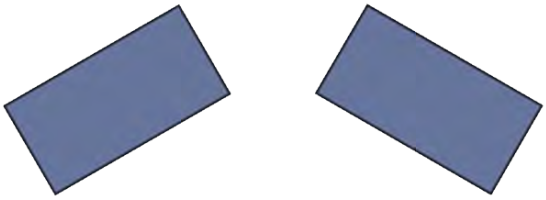


Archwire prior to detorquing



Torque removed from posterior segments (90 degree twist brings the wire back to straight).

- Using ribbon arch pliers, remove the torque in the posterior segment distal to the laterals.
- With one plier placed distal to the lateral and the other plier on the end of the arch wire, twist the back plier to the outside 180 degrees.
- This will remove the lingual root torque in the posterior segment and by over twisting to the 180 degree point will place desired labial root torque in the posterior segments.



An additional 90 degree twist places labial root torque in the posteriors.

- Hold the upper arch in an .018 x .025 for 2-3 months.
- Follow the regular finishing steps for Class I, since the patient has been corrected to a Class I.
    - Cross Arch Elastics & Sectionals
    - Bracket Removal
    - Final Records
    - Deliver Retainers

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Preparing & Placing the MDA

On The UPPER Arch - This Can Also Be Used On The Lower

The MDA

- Can be used on both arches towards the end of treatment
- Comes in Sizes 1-9
- Sizes 4 & 5 are the most common (start there)
- Lots of Little Details – Let's break it down into 3 Sections:
    - Preparing the Patient
    - Preparing the Appliance
    - Placing the Appliance

Preparing The Patient

- Place the .018x.025/SS arch wire on the opposing arch using Glide Ties or Power Chain
- Size the appliance by using a wax pattern taken on the patient – Marking the mid-line & mesial to buccal tubes on 1st molars (6's)
- Remove the brackets on the 2nd Premolars (5's)
- Place sectional wires using the existing .016 x .022/SS from the 6's-7's (both sides) – Molars will track back together

Preparing The Appliance

- Bend the distal legs buccally – they are tipped in
- Smooth the distal ends – could be burs from production
- Squeeze the omega loop together
- Bend the omega loops away from the tissue – buccally
- Make offset bends at the cuspids – make the mark mesial
- Cut 5-6mm springs (.010 x .045/Nitinol) for each side to distalize

Placing The Appliance

- Use Vasoline to hold the springs in place
- Place LONG ligatures around the 1st premolar (4's) brackets ("cat whiskers")
- Insert the MDA and tie the LONG ligatures to the hooks on the MDA – Cinching it into place
- Tie-in the laterals (2's) with shorty ties around the entire bracket
- Power Chain (PC) mesial 2-2
- Activate the MDA using the Omega Loops by sliding the distal leg distally which will compress the springs
- Elastic wear 24/7 - 1 Extra Heavy elastic per side - Stress the importance
- Appoint MDA patients every 3 weeks to monitor progress

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Pre-Fabricated & Lab-Fabricated Appliances

Phase I & Phase II

Basic Course

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Pre-Fabricated & Lab-Fabricated Appliances

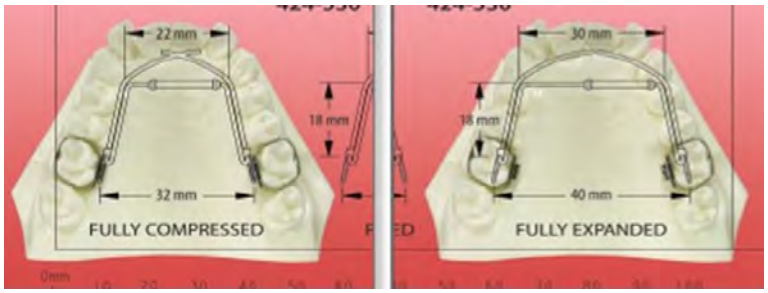
Phase I & Phase II

- I have always gravitated away from custom and prefab appliances appliances that allow you to treat sagittal and transverse problems in Phase I/Phase II mixed dentitions because I tend to be "cheap and lazy". So, you really don't get much exposure to these appliances.
- There is no "hands on" relative to Herpst, Jasper Jumper, Reverse Face mask, RPE, Quad Helix, Hilger, Snodgrass, Pendulum, CD distalizers, EZ distalizers, etc.
- I want to make sure that you know that if you wish to use these appliances, particularly in Phase I, any orthodontic laboratory, such as Johns Lab will be very happy to advise you on any of these that are lab fab appliances.

Expansion

Maxillary and Mandibular Crowding and Constriction

- Transverse Transforce



- Williams

- Lower Fixed Transverse

- Rapid Palatal Expander (RPE)

- Nitanium Palatal Expander (NPE)

- Quadhelix

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Molar Distalization

- EZ Distalizers


- CD Distalizer

- Hilgers


- Snodgrass

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Jaw Re-posturing & Profile Enhancement- Moving the Maxilla or the Mandible

Maxillary Protraction– Moving the Maxilla Forward

- Modified Tandem Appliance

The Tandem appliance is designed for Class 3 patients with skeletal mid-facial deficiencies. The problem with previous methods has been one of compliance, due to both the physical appearance of the extra-oral appliance and skin irritation from the facemask pads. The Tandem functions similarly to traditional facemask therapy with the exception of a more comfortable fit and wear for the patient. This comfortable intra-oral fit translates into higher acceptance and keeps treatment times on track for the clinician. We also offer a fixed version (shown below) to address non compliant concerns. Other Class 3 correction appliances from Johns Dental include: the CD Remodeler, the Anterior Drive Hyrax, the Evans Sagittal, the Twin Block, the Frankel and the Han.

- Reverse Face Mask


Mandibular Re-posturing

Mandibular Re-posturing is Usually Coupled with Maxillary Expansion

- Herbst

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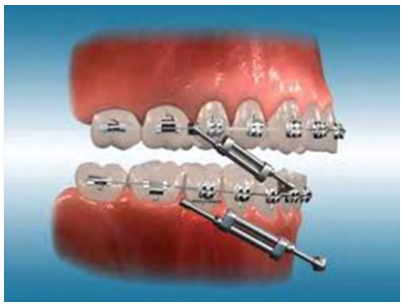
- Jasper Jumper

- Twin Force



- Twin Block

- Mara Appliance

A Mandibular Anterior Repositioning Appliance or MARA is a functional appliance that postures your lower jaw forward over the period of a year. This appliance is used to correct a severe over-bite relationship where the lower jaw is underdeveloped. Optimizing the growth of the lower jaw can significantly improve a profile where the lower jaw is considered “weak”.

A MARA appliance consists of four bands attached to the permanent first molars. A u-shaped elbow butts up against a pad attached to the lower molar crown and positions the lower jaw in a more forward position. This forward positioning over a period of months encourages lower jaw growth, forward movement of lower teeth, and backward movement or distalization of upper teeth. In this way the gap between the upper and lower jaw is minimized and the profile is im-proved.

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Making Orthodontics Fit in a GP or Pediatric Practice

Basic Course

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Making Ortho fit in a GP or Pediatric Practice

Seven Secrets to Successful Orthodontics in the General Practice

1. $taffing
2. $cheduling
3. $electing cases
4. $etting fees
5. $tandard of care records
6. $ensible expectations
7. $crupulous ethics (the golden rule)

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1. $taffing

Empowered Assistants & Staff

Susan Coffey, RDA offers on-site orthodontic integration for your office along with assistant training courses.
www.SusanCoffeyConsulting.com

Casey Houston, WD&O Orthodontic Assistant– over 12 years

WILLIAMS DENTAL & ORTHODONTICS









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2. $cheduling

- Whole office schedule dedicated to ortho or GP Dave called it “ducks with ducks”
- Ortho schedule runs in background like hygiene, one op dedicated to ortho all time
- “Early in the Morning and Late at Night”
- “KISS”

3. $electing Cases

No sense in **burying your head** in the sand, you just can’t ignore the fact that some cases should be referred.

The last thing you need are ortho patients who have no **horse** sense.

Some patients can be stubborn as a **mule** about insisting you treat them!

DON’T **MONKEY** AROUND WITH THIS ONE…

FORGET THE SHEEPISH GRIN, THIS ONE HAS **GOAT** TO GO!

THIS CASE IS GOING TO BE UN**BEAR**ABLE TO TREAT!

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Select Cases Within The Scope Of Your Abilities And Practice Objectives!

Patient Selection Criteria for Beginning Doctors

1. Treat both arches, not one (unless it is a crossbite).
2. Do not treat patients with TMD.
3. Do not treat compromised patients OR PITA'S (multiple missing teeth; medical conditions; etc.) (BAD ATTITUDES).
4. Do not treat full-step class II's. Treat patients with an ANB which falls generally within a range between 0-8°.
5. Treat patients with a WITS which falls generally within a range of -2 mm and + 6 mm.
6. GoGn should generally be no greater than 40°.
7. GoGn should generally be no less than 25°.
8. Avoid Class III cases until you have more experience.
9. Treat Class I and Class II dental and skeletal cases.
10. Treat all cases non-extraction for nine months.

Bottom Line on Case Selection!

- Class I cases and simple Class II cases.
- Be a true GP orthodontist, refer the tough ortho stuff!
- The Williams Parameter box; stay inside the box! Stay happy! Make money!

4. $etting Fees

2020 Fees in My Practice

- Records- $429.
- Phase I - 12 months- $2850.
- Class I - 18 months- $4990.
- Class II - 24 months- $5400.
- Class III - 30 months- $5800.
- Trutain Retainers (each) $160.
- Dean Retainer- $475.
- Lingual Retainer- $286.

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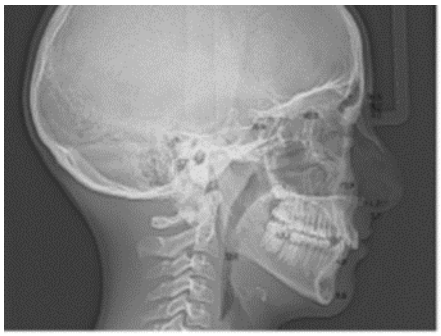
5. $tandard of Care



Skeletal Class I (ANB = +3.8° WITS = +0.8 mm)

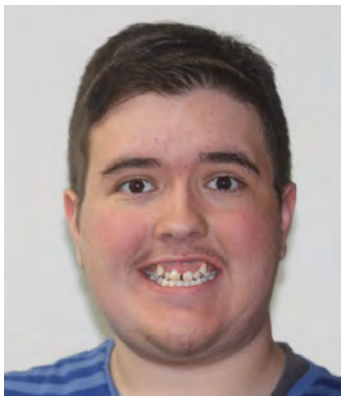
Records and Forms

- It is imperative quality records are taken by the practitioner.
- Records which we deem acceptable in general dentistry may not be in orthodontics.

- The following records are considered "Standard of Care" in orthodontics:
  - Quality Orthodontic Study Models
  - Quality Cephalograph
  - Quality Panolipse or FMX
  - Quality Seven Series or Bitewings
  - Quality Photos (8-9)

- **Recommended Additional Records:**
  - Quality Transcranial Radiograph (or Tomogram) of TMJ
  - TMJ Examination
  - Airway Evaluation (Tonsils and Adenoids)

6. $ensible Expectations (Realism/Idealism)



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Before **After**








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Before

After

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7. $crupulous Ethics (THE GOLDEN RULE)

Conclusion

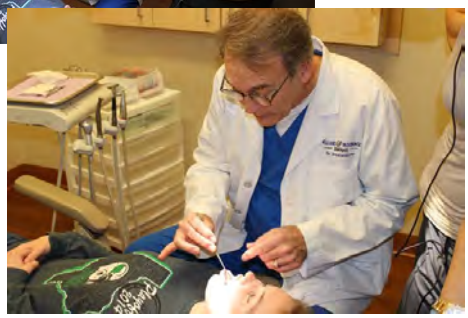
You've got to get the fundamentals down... or the fancy stuff doesn't matter.

Gaining the Fundamentals are achieved by:

- Tier Advancement
  - AOS
  - AGD

Continuing Education

- Basic
- Advanced
- Update Weekends
- Assistant Training & Workshop
- Managing Orthodontics in the GP Practice
- After an educational base is formed, take other courses to challenge your beliefs



Internal Marketing Top Five

- Ask your patients for referrals.
- Ask your patients for referrals.
- Ask your patients for referrals.
- Ask your patients for referrals.
- Ask your patients for referrals.

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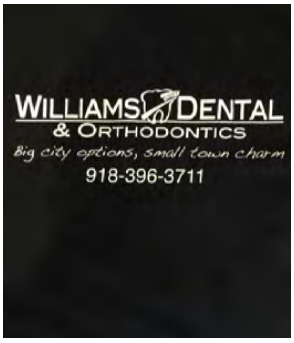
Other Internal Marketing Concepts

- Call your patients at night (After all invasive procedures & strap ups)
- Handwritten notes to your new patients
- Flowers or plants for your patients
- PR items like mugs, magnets, t-shirts
- Bleaching trays after orthodontics
- Pictures & cases of your patients in your waiting room
- Ortho cases shown on a video in waiting room
- Running Dolphin Aquarium in waiting room or ops
- Separate ortho patient sign-in sheet
- Ortho on your business cards, magnets, etc.
- Diplomas and awards everywhere
- Banded & Bracketed typodonts in all operatories
- Complimentary orthodontic exams (with pan)
- Signs posted in waiting room & ops asking for a positive review on **Google** & Facebook
- Your Hygienist and Assistants being your cheerleaders

Marketing Pearl

- App for your smart phone that goes straight to voicemail. Patient assumes they missed your call, you still show you care but do not have to engage in a long conversation if you don't want it. You can still let them know that they can call you if they are having problems.



External Marketing Ideas

- Website
- Internet
- Social media
- Direct mailers
- Local magazines
- Billboards
- Newspaper
- TV/Radio
- Yellow Pages– in small local markets
- Local sporting events– programs and banners
- Charity event donations
- A message needs to be heard **5-7 times** to be remembered

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External Marketing is hard to track

- Work in a cycle
- Repetitive branding of your name
- Five times rule

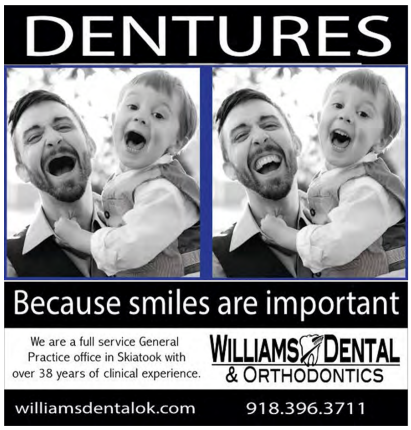
Dental Economics, www.dentaleconomics.com, and Dentistry IQ, www.dentistryiq.com, are good resources for marketing budget information and promotion ideas.

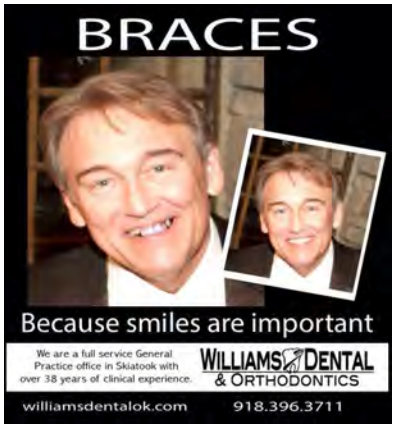
In my office, I use **Jameson Management**, **www.jamesonmanagement.com**, for website management.

Marketing Examples

Hygiene Recall Cards

Newspaper ads that ran as a series over 3 weeks in local





Billboard placed on main highway

Yard signs

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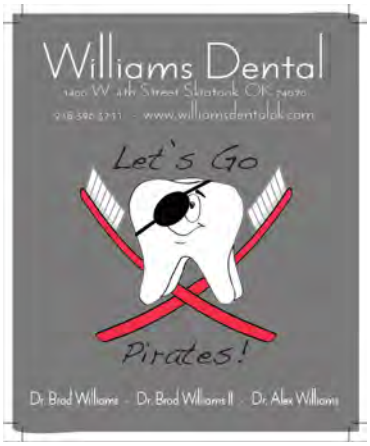
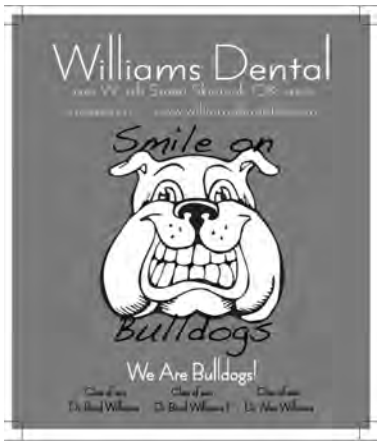
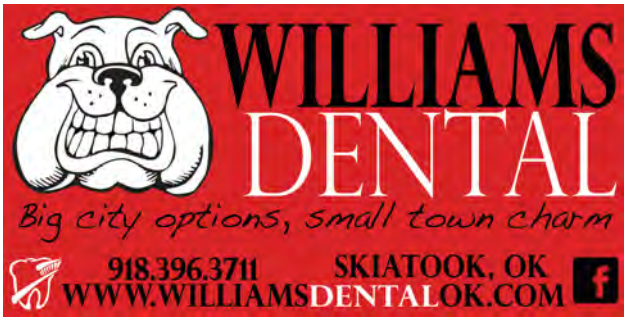
T-shirt give aways in the office and at football games.

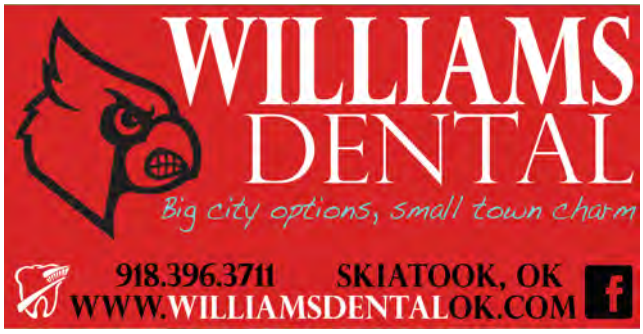
Ads placed in local sporting event program guides





Banners places at local high school football fields





Orthodontics as a Profit Center

To Achieve Orthodontics as a Profit Center

- Excellent records
- Take the time to do the diagnosis
- Charge appropriately
- Firm financial arrangements– paid in full at beginning of treatment is best and only reason for discount
- Schedule– must allow for morning & evening ortho appointment hours due to school with general dental in the middle of the day
- Trained staff
- Continuing education

Indirect Profit Center

- ONE STOP SHOP
- Orthodontics fills the other profit center in your practice
- Hygiene/Perio patients
- Restorative patients
- Great referral source

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Other Profit Makers

- Meat and potatoes– Class I & Class IIs
- Not bad Class IIIs
- No high angle cases
- No uncooperative kids or adults
- Firm financial with responsible party
- If the child doesn't buy in, don't do it!!

Evaluate Your Practice

- A group effort
- What works
- What doesn't work
- Strengths vs weaknesses
- Front office/ back office morale
- Service
- Quality of care

In order to take control of your practice, you first must develop a Business Plan (Vision)

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EXERCISE SECTION

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Instrument Identification List & Supplies

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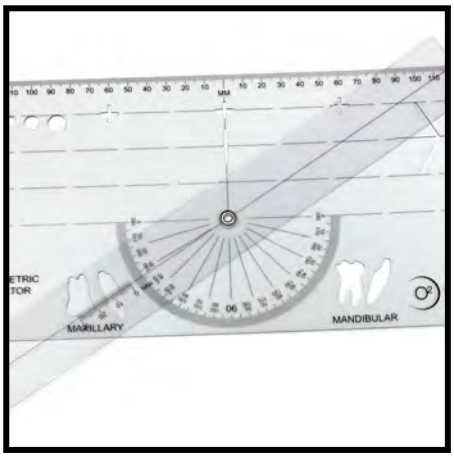
Anatomical Teeth

Angled Utility Arch Plier

Arch Markers

Band Biter

Band Pusher/Scaler



Ceph Protractor

Clear Articulated Typodont

Cinch Back/Distal Bender

Cotton Tweezers/Slot Aligner

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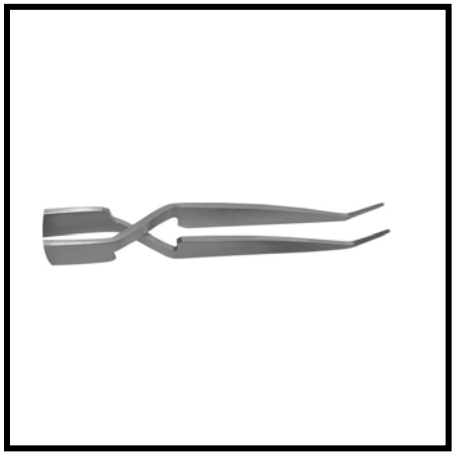
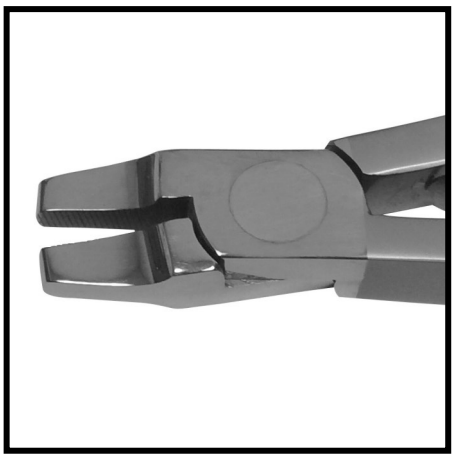


Deluxe Bracket Placer/Slot Aligner

Deluxe Elastic Separating Plier

Distal End Cutter

Double Ended Elastic Remover



Goodman Torquing Plier

Heavy Duty Wire Cutter

Hollow Chop Plier

Jarabak Plier

Ligature Director/Remover

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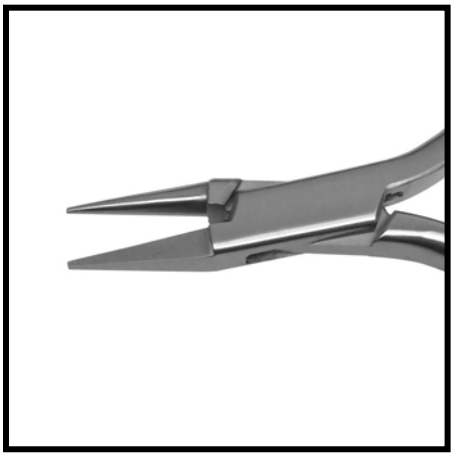
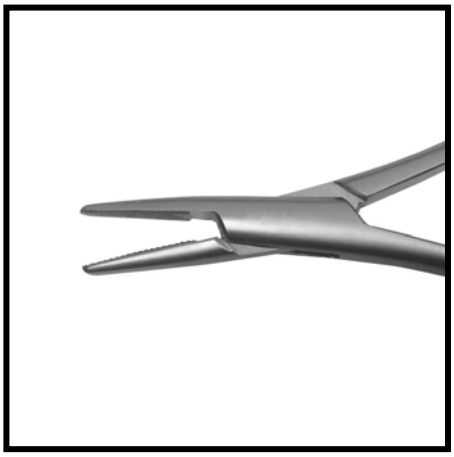


Light Wire Plier (Long Bird Beak)

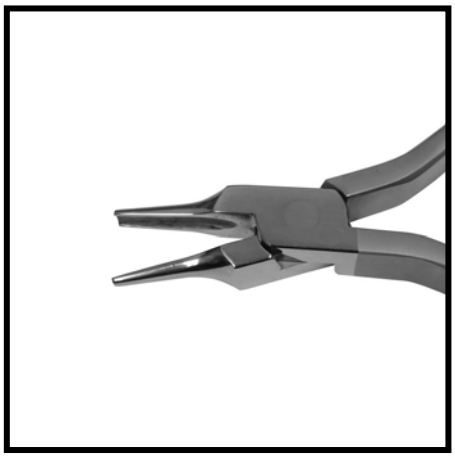
Lingual Arch Forming Plier

Loop Tie Back Plier

Mathieu Needle Holder
Hook Tip



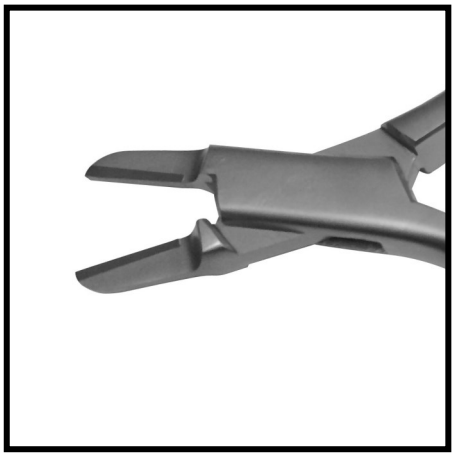
Mathieu Needle Holder
Regular Tip



Optical Plier (Occulist)

Pin & Ligature Cutter

Posterior Band Remover



Ribbon Tweed Arch Forming Plier (2)

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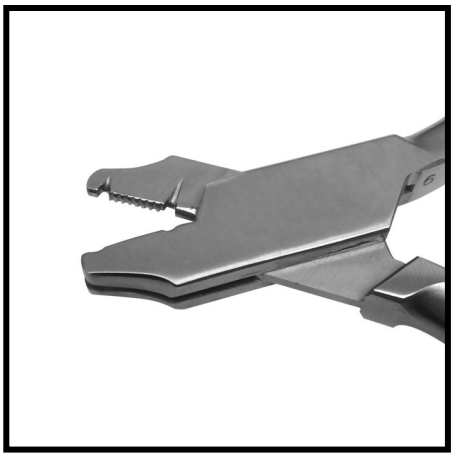
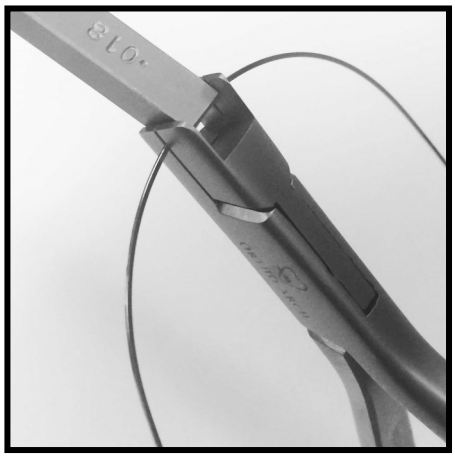
Step Plier– 3/4mm
Step Plier– 3mm

Swivel Head Bracket Gauge

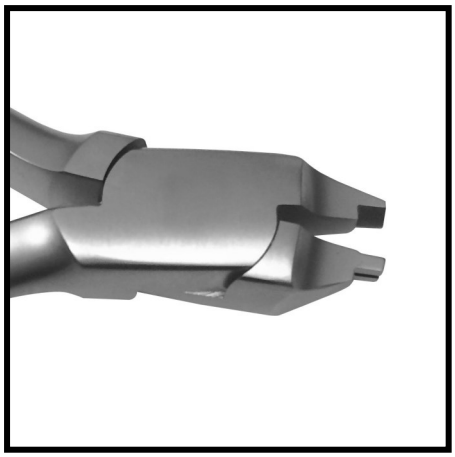


Three Prong Clasp Plier
(NPE Adjusting Plier)

Three Prong Plier

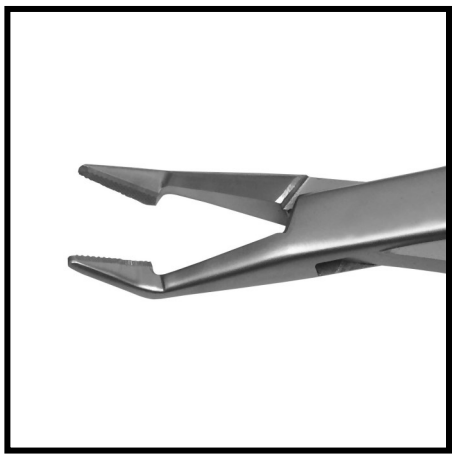


Torquing Plier Set w/ Key



Ultimate Hook Crimping Plier

V-Bend Stop Plier



Weingardt Plier

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Exercise 1

Bracketing Anatomical Teeth

Understanding Bracket Placement

Basic Course

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Bracketing Anatomical Teeth

Understanding Bracket Placement

Purpose:

- To become familiar with orthodontic brackets and how to place them on the teeth
- Understand how the position of the bracket affects the axial inclination of the crown and root of the tooth as well as the horizontal position of the incisal edge and/or occlusal cusp(s)

Instruments & Materials Needed (Prior to Start of Class):

- Anatomical Teeth Models
- Cotton Tweezers/Slot Aligner
- Deluxe Bracket Placer/Slot Aligner
- Distal End Cutter
- Elastic Remover
- Heavy Duty Wire Cutter
- Mathieu Plier - Hook Tip or Wide Tip
- Swivel Head Bracket Height Gauge
- Weingardt Plier

Materials Provided:

- .019 x .025 Stainless Steel Archwires
- Glide-Ties
- Mechanical Pencil
- Straightwire Horizon Brackets (2nd Molars to 2nd Molars)
- Super Glue Gel
- Acceleratory Spray

Directions:

The vertical axis of each Straightwire Bracket is designed and constructed to be located on the vertical long axis of the tooth's crown. Therefore, you must begin by locating the long axis and finding the center of the tooth.

NOTE: Leave the anatomical teeth on the plastic card while marking the lines with the mechanical pencil and placing the brackets in position, it will make your life easier.

NOTE: Taking the teeth off the plastic card one at a time will help in tie them on the wires.

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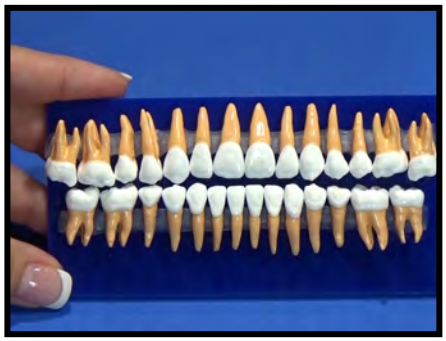
Bracketing Anatomical Teeth

Understanding Bracket Placement

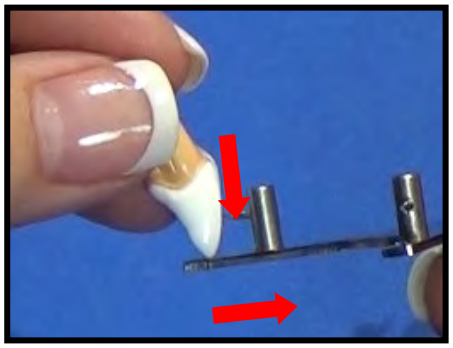
Upper Centrals	4.5 mm
Upper Laterals	4.0 mm
Lower Incisors	4.0 mm
Cuspids	5.0 mm
First Premolars	4.5 mm
Second Premolars	4.0 mm
First Molars	3.5 mm
Second Molars	3.0 mm

New and Finished Exercise for Anatomical Teeth.

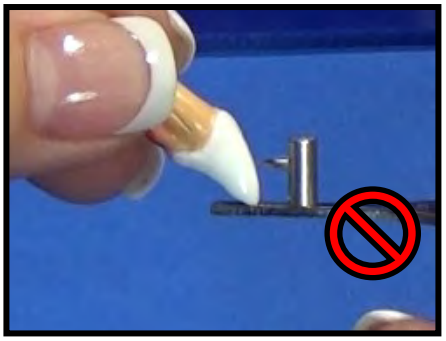


New set of Anatomical Teeth.

Finding the long axis of the tooth and placing pencil marks.



Bracket Height Gauge must be perpendicular to the incisal edge of each tooth.



INCORRECT POSITION of the Bracket Height Guage.

INCORRECT POSITION of the Bracket Height Guage.

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Find the horizontal line using the height gauge and score it.

Make a pencil mark on each scored tooth to give you the horizontal line.

Use a small amount of glue and place bracket on the “cross-hairs”.

Make sure the bracket scribe line is on the vertical pencil mark.

Use the Bracket Height Gauge to make sure you are at the correct height.

1st molar brackets are aligned with the mesial pencil line.

2nd molar brackets are also aligned with the mesial pencil mark.

All anatomical teeth are now bracketed.

Lightly spray the teeth with acceleratory spary.

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Remove teeth one at a time to start placing them on the arch-wire.

Using glide-ties and a Matthieu Plier, tie in each tooth to the archwire.

UR1 through UL5 have been tied into the archwire

The molars are simply threaded on the archwire.

Place the Weingardt Plier distal of the last molar and using your finger…….

Create a 90° bend distal of the last molar.

Use a Distal End Cutter to re-move the access archwire, make sure they clip AND HOLD, very important.

This bend will keep the molars from sliding off the wire.

UL quadrant completed.

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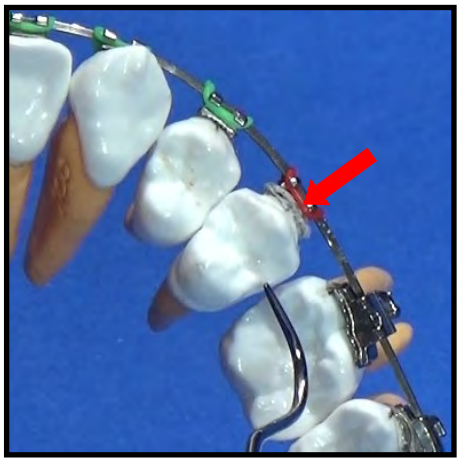
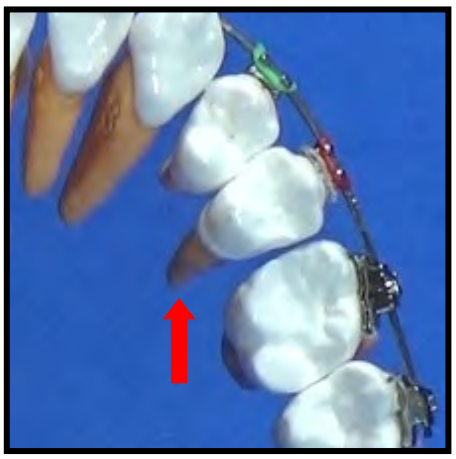
Both arches completed. Let's take a closer look…...

Look at the roots on the canine and the 1st premolar, they are touching.

An occlusal look at the same two teeth and how they are out of alignment.



Another issue is having too much glue that was not expressed when placed (UL5). This pushes the facial of the tooth in.



Looking at the same tooth and the root, it has given the root lingual root torque, which is not what we want.

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Demonstration

Separators- Understanding Placement

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Separator Demonstration

Understanding Placement

Purpose:

- To show different techniques placing separators
- To show different types of separators

Instruments & Materials Needed to Place Separators in Office:

- Brass or Niti Separating Wire
- Elastic Separating Plier
- Floss
- Jarabak Plier
- Safety Knob Separators

Directions:

1. Prior to banding, separators must be placed for space to seat molar bands.
2. Using Elastic Separating Plier, pull a separator from the wheel.
3. Lubricate the separator with spit (not yours!) or fluoride to help seat the separator.
4. To remove separators, use an elastic remover for the Safety Knobs and a Jarabak Plier for the Metal Springs.

Note:

- Careful to not stab the patient with the plier, it will happen.
- Elastic separators can be left in 1-2 weeks, Metal Springs are left in for 2-3 days.
- Instruct patient to not floss in these areas and to notify the office if any come out.
- **If a separator is missing when the patient returns, verify that it has come out and has not gone sub- gingival.**

Instruments & Materials.


Safety Knob Separator.


Placing a Safety Knob Separator

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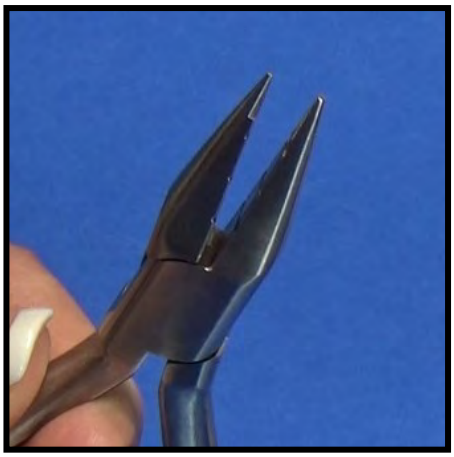
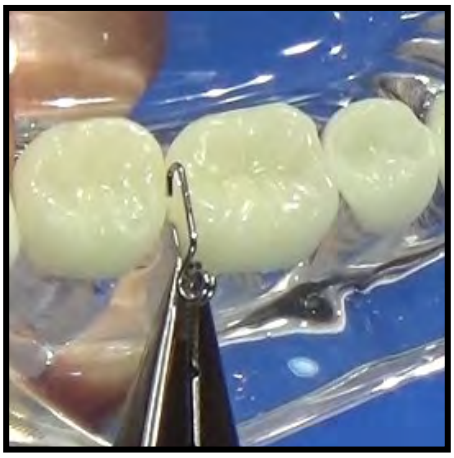
Two Safety Knob Separators placed to band 1st molar.

Using floss to place Safety Knob Separator. To remove, use Elastic Remover.



Jarabak Plier used to place Metal Separators.

Metal Separating Spring.



Inserting Metal Separating Spring.

Insert plier into helix remove the separator.

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Exercise 2

Banding & Bracketing

Using the Clear Typodont

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Banding & Bracketing

Using the Clear Typodont

Purpose:

- Become familiar with bands & brackets and how they are placed
- Prepare the typodont for the remainder of the exercises for this course and the Level 2 course

Instruments & Materials Needed (Prior to Start of Class):

- Band Pusher/Scaler
- Band Seater/Bite Stick
- Clear Typodont – Specifically from **Ortho Arch**– this has been the model used to size all bands, brackets and appliances that will be used for **ALL** Dr. Williams' courses
- Cotton Tweezers/Slot Aligner
- Deluxe Bracket Placer/Slot Aligner
- Distal End Cutter
- Elastic Remover
- Posterior Band Remover
- Swivel Head Bracket Height Gauge

Materials Provided:

- Straightwire Mini Twin Brackets
- Bands for 1st & 2nd molars with Dr. Williams' prescription
- Super Glue Gel
- Accelerator Spray
- Mechanical Pencil

Directions:

1. Correct bracket placement is the key to successful orthodontics. Brackets are routinely placed using the following measurements. There can be adjustments made, as needed. Patients that have shorter or longer than 'normal' clinical crowns may need adjustments. For this exercise, place the brackets following the measurements below. Be aware of the molar bands, first molar band slots cannot be positioned gingivally more than 3.5mm. This is why the measurements below are a good standard to use. Make sure the bracket gauge is parallel to the incisal edge of the tooth and the same angle is used on each tooth.

Upper Centrals	**4.5 mm**
Upper Laterals	**4.0 mm**
Lower Incisors	**4.0 mm**
Cuspids	**5.0 mm**
First Premolars	**4.5 mm**
Second Premolars	**4.0 mm**
First Molars	**3.5 mm**
Second Molars	**3.0 mm**

Note: Remove the molars, seat and glue the bands, LET THEM DRY, then place them back in the typodont.

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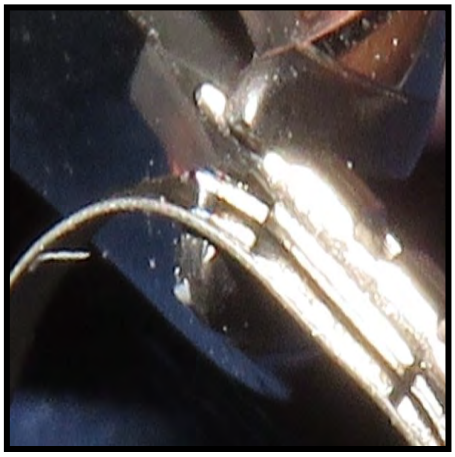
New typodont to band & bracket.

Instruments & materials.

Angulation of gauge is important.

Cleats are sticking out on bands when they arrive.



Using a Weingardt plier, push the cleats in toward the band.

This is what it will look like once the cleat is pushed in for patient comfort.

Using a Weingardt Plier, pull the gingival hook out buccally.

This is what the band will look like after making all the adjustments.

Another angle to see the cleats and the hook with the adjustments.

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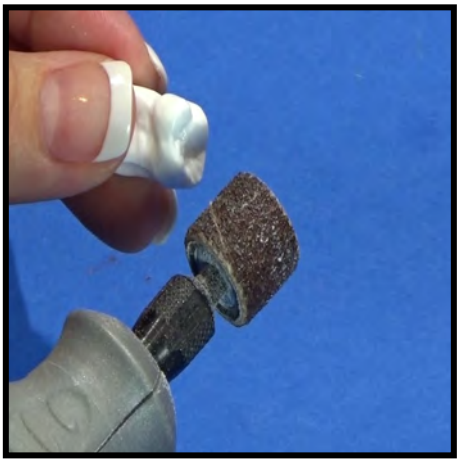
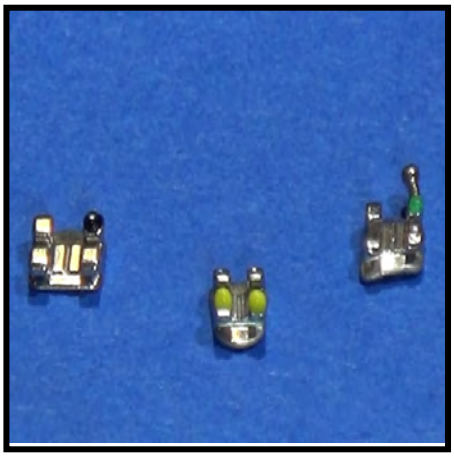


If needed, adjust the molars to fit the bands using the Dremmel tool.

Use a small amount of glue inside the band to seat.

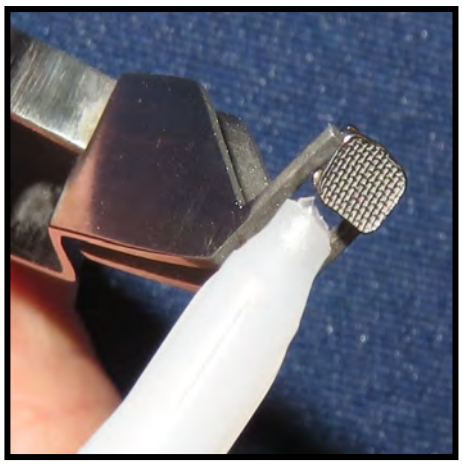
Use the Band Pusher instrument to help seat the bands.

Brackets are laid out in quadrants like the Palmer system-UL UR LL LR.



Mini Twin Brackets.

Brackets will be placed on upper and lower arches 5-5.



Use a SMALL amount of glue to seat brackets.

Press firmly against the teeth to seat the brackets.

Pay attention to the long axis of the tooth.

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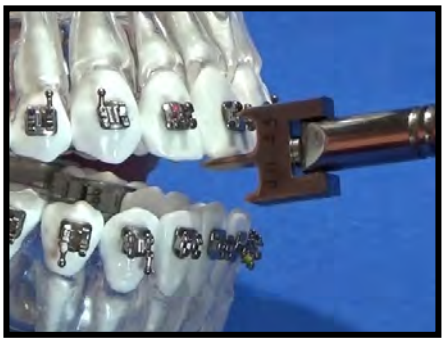
Look for the same amount of tooth structure mesial & distal of brackets.

Great view to look for the long axis of the tooth, especially on patients.



Using a bracket height gauge, make sure the tip is in the wire slot.

Measure the length of the arch and cut the wire prior to placement.

Upper Centrals	**4.5 mm**
Upper Laterals	**4.0 mm**
Lower Incisors	**4.0 mm**
Cuspids	**5.0 mm**
First Premolars	**4.5 mm**
Second Premolars	**4.0 mm**
First Molars	**3.5 mm**
Second Molars	**3.0 mm**

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Exercise 3

Utility Archwires (UAW) for Mixed Dentition

Pre-Fabricated

Basic Course

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Utility Archwires for Mixed Dentition (UAW)

Pre-Fabricated

Purpose:

- Treat patients with mixed dentition - Phase I or Early/Transitioning into Phase II
- Align the anterior teeth
- Advance the anterior teeth, if needed
- Close space in the anteriors
- Rotate the maxillary molars, if needed (TOE-IN)
- Open the bite by intruding the anterior teeth, if needed (TIP BACKS)

Instruments & Materials Needed (Prior to Start of Class):

- Angled Utility Arch Plier
- Distal End Cutter
- Elastic Remover- Explorer
- Heavy Duty Wire Cutter
- Mathieu Plier- Hook Tip & Wide Tip
- Weingardt Plier
- Flexi-Ruler
- Arch Markers

Materials Provided:

- .018 Nitinol Upper Pre-Fabricated Utility Archwire
- .016 x .016 Stainless Steel Lower Pre-Fabricated Utility Archwire
- Glide-Ties

Directions:

The prefabricated utility archwire (UAW) comes in kit with different wires sizes and multiple anterior sizes for each wire ranging from **28mm - 42mm.** This UAW comes assembled using 3 sections, an anterior portion and 2 distal portions. **The anterior section is what changes with your wire size and anterior sizes. The distal sections are all .016x.016/Stainless Steel.** These distal legs slide like a trombone onto the anterior section (this is another sizing option for each patient).

In this exercise, remove 2nd molars and all 3's, 4's & 5's. For Phase I Tx.

Another view of the typodont prepared for Phase I Tx.

Utility Arch Wire Kit (UAW)

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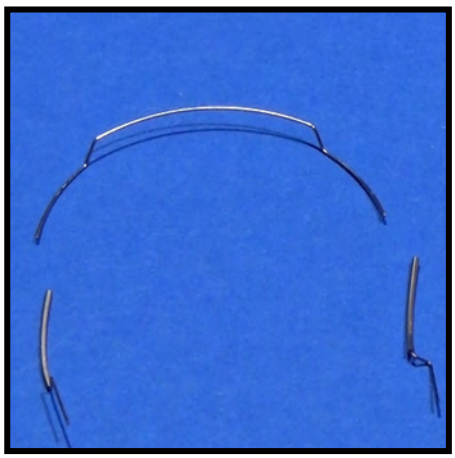
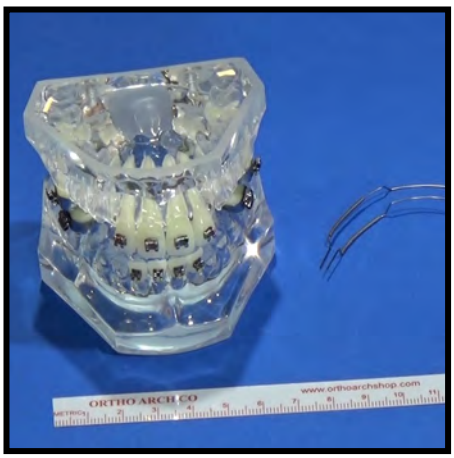
UAW is prefabricated and comes in multiple sizes for the anterior teeth.

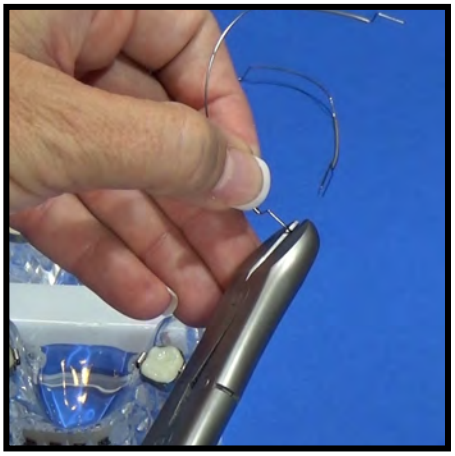


UAW steps up/down to bypass any baby teeth still present. It separates into 3 sections.

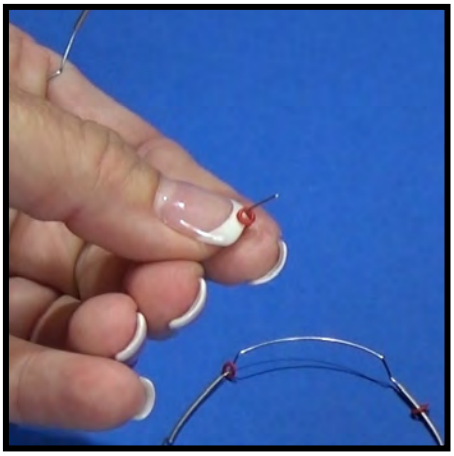


Use a flexible ruler to measure along the arch form to size the UAW.

Measure distal to each lateral for the approximate size needed.

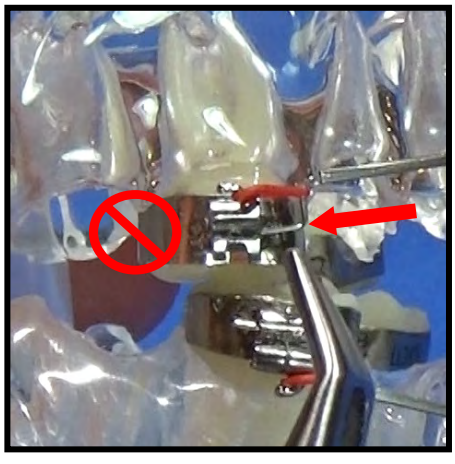


Using the Heavy Duty Wire Cutter, always cut half of the distal legs off first.

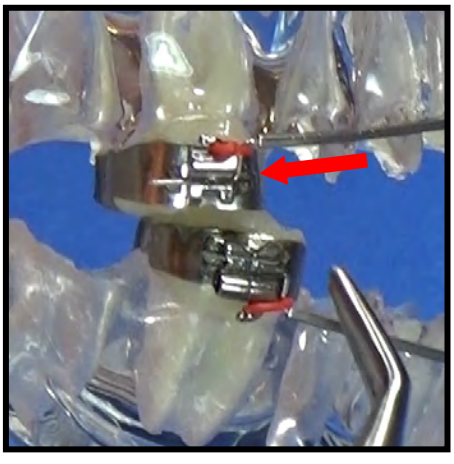


Using a bright color, slide glide-ties on each leg prior to insertion.

Insert the wire into the wire slot on each 1st molar.



INCORRECT-NOT FLUSH. Very important to make sure the wire is flush with the mesial tube.



CORRECT– FLUSH. Using a Matthieu plier, hook the glide-ties over the 1st molar hooks only.

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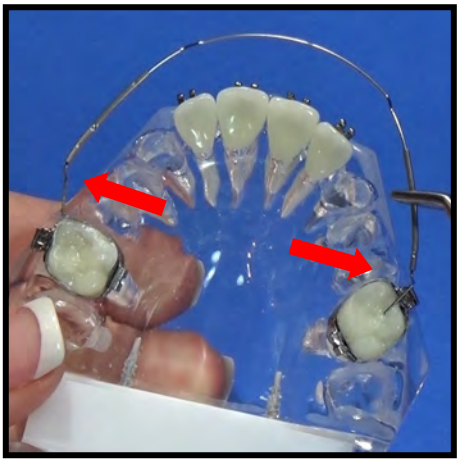
These glide ties will make sure the wire will not pull out.

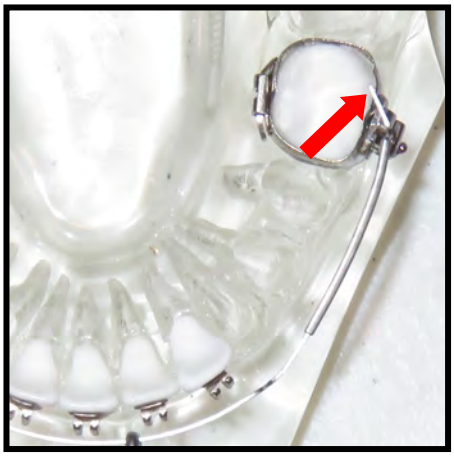
Using glide-ties, tie in each wire.

Completed UAW Typodont.

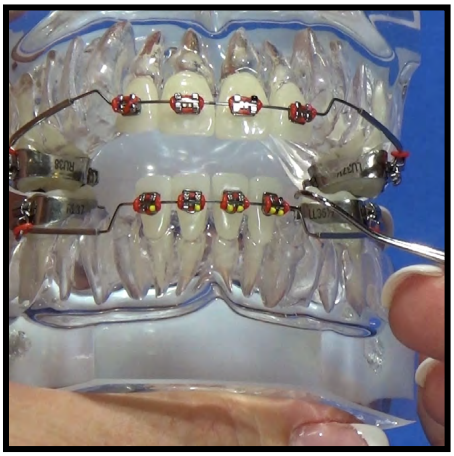
TOE IN BENDS—USED ON ROTATED MOLARS



TOE IN BENDS will rotate 1st molars, notice the 'pigeon toed'…..

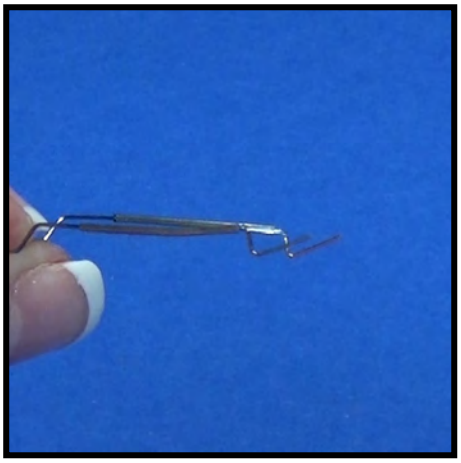


distal legs on the typodont, this can be more challenging to seat the wire.

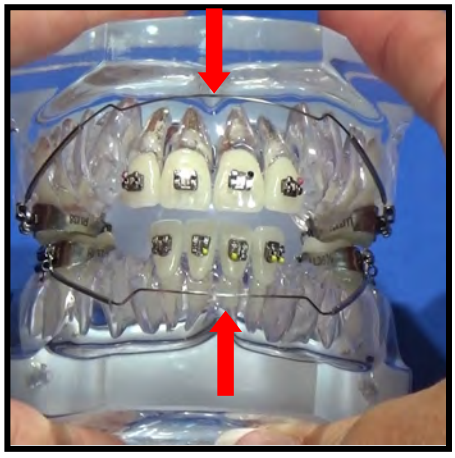


Completed UAW Typodont.

TIP BACK BENDS - USED TO OPEN DEEP BITES



TIP BACK BENDS will open bites with deep anterior bites. Make sure the bends are equal at ~45° angle.



When placed, wires should be in the vestibule, pull wires into brackets to engage & tie in.

Do this on both arches and this will cause intrusion to open the bite.

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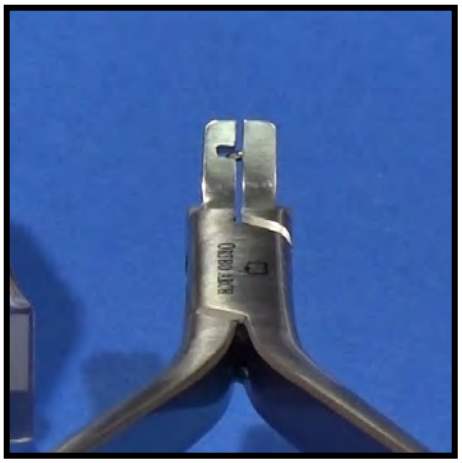
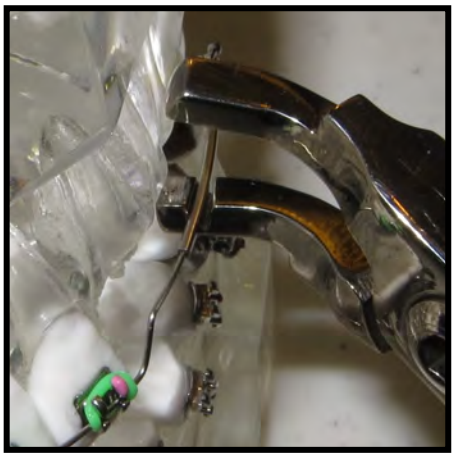
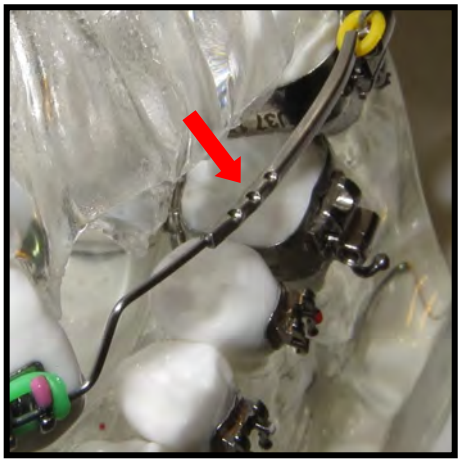


ALL WIRES MUST BE CRIMPED, using the UAW Plier.

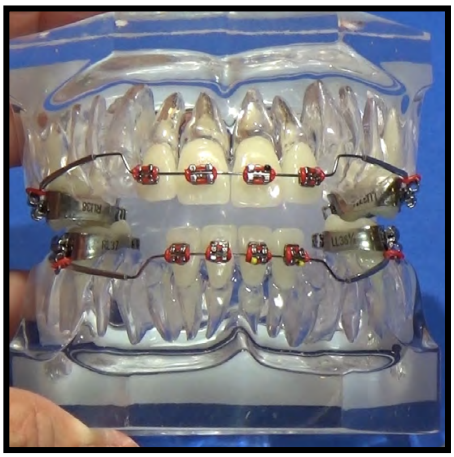


Insert wire into the trough on plier and pull away from the gums, this….

Gives some advancement PRIOR to crimping. Squeeze tightly to crimp.



Crimp 2-3 times to ensure wire is now one solid unit.



Completed UAW Typodont.

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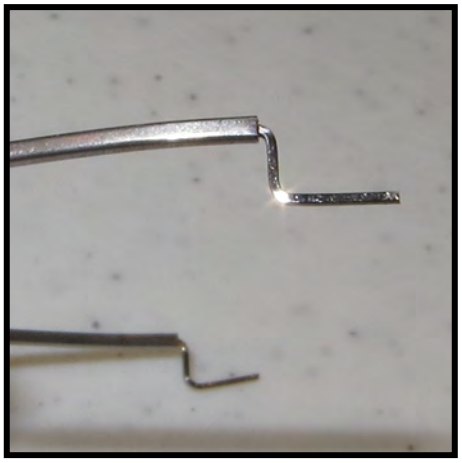
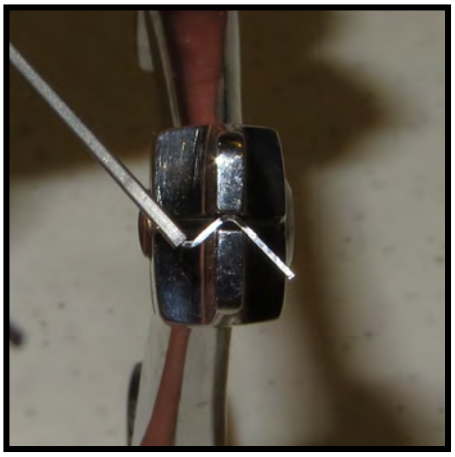
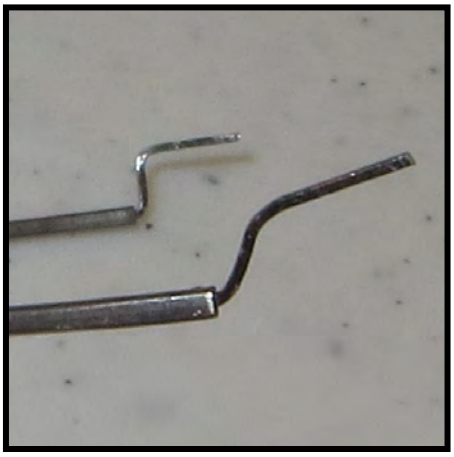
ADVANCEMENT



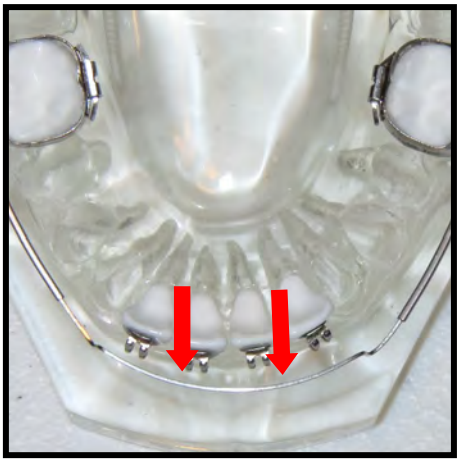
ADVANCEMENT after wires have already been crimped.



Use a flat-on-flat plier to lengthen the wire from a 90° angle to...



Approximately a 45° angle.



This creates advancement in the wire, gently engage the wire & tie in.

Completed UAW Typodont.

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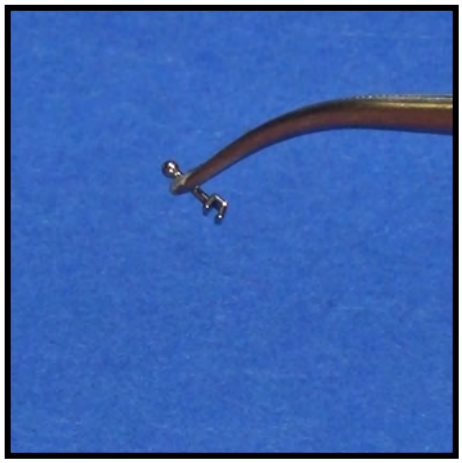
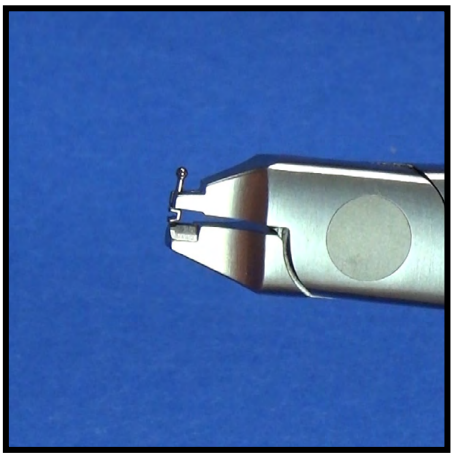
INCORPORATING ELASTICS

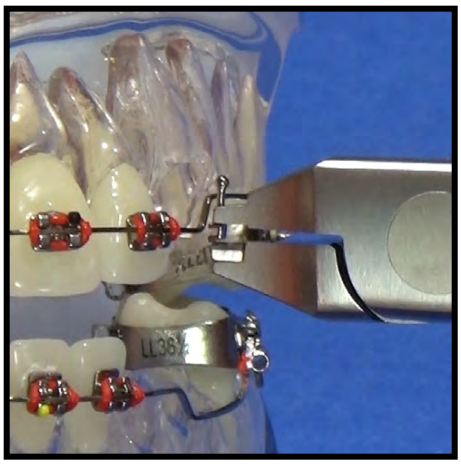


Use crimpable hooks on rectangular wires to incorporate elastics.

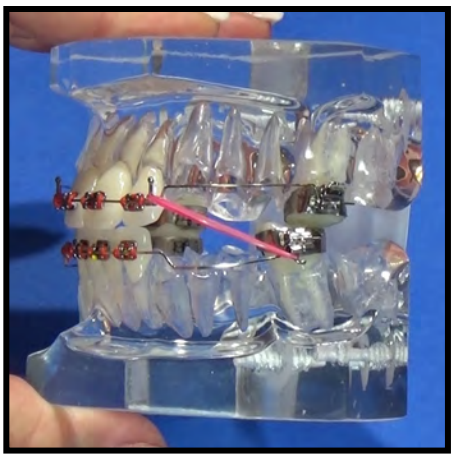
Use the Ultimate Crimping Plier to crimp the hooks on the wire. This can be done intraorally.



Gently pick up the hook with the open side facing out to crimp on the wire.



Crimp distal to the laterals and squeeze tightly to ensure the hook will not move.



This is showing a Class II elastic from the hook to the lower 1st molars.

Completed Exercise.

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Exercise 4

Nitanium Palatal Expander (NPE)

Palatal Expansion

Basic Course

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Nitanium Palatal Expander (NPE)

Palatal Expansion

Purpose:

- Achieve lateral arch development
- Ability to rotate maxillary molars
- Attain good arch form in Phase I or Phase II treatment

Instruments & Materials Needed (Prior to Start of Class):

- Flexi-Ruler
- Mathieu Plier– Hook Tip & Wide Tip
- NPE Adjusting Plier
- Three-Prong Plier
- Weingardt Plier

Materials Provided:

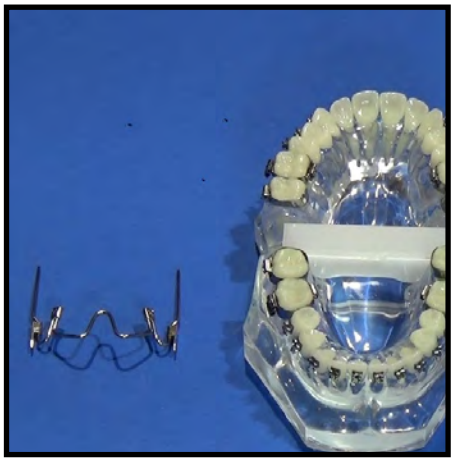
- Nitanium Palatal Expander (NPE)
- Glide –Ties
- Refrigerant Spray

Note:

- If the patient has a narrow palatal arch AND rotated molars, the power arms would need to be adapted lingually so they will not touch the lingual of the premolars or cuspids. As the palate expands AND the molars de-rotate, this creates a pendulum effect on the power arms and could create a reverse (scissor) cross bite. By using a three-prong plier, adapt the power arms closer to the premolars and cuspids as the molars de-rotate. Check these patients regularly to monitor the molars and the patient's bite.
- If no expansion is desired in the premolar and/or cuspid areas, these arms may be completely removed or shorten as needed by using a heavy duty wire cutter.

Directions:

Nitanium Palatal Expander (NPE) Kit



Materials Provided: NPE and refrigerant spray.

Measure lingual to lingual of the 1st molars. Add ~4mm for the size needed.

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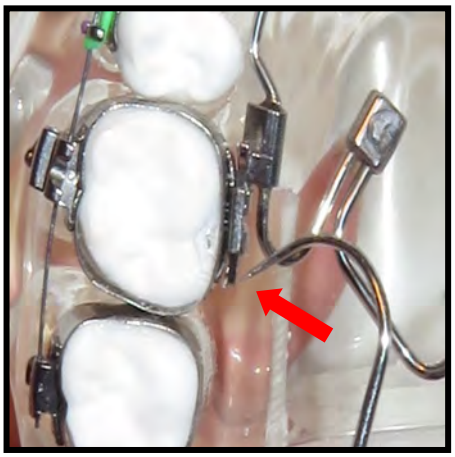
Using ice water allows easier placement in a constricted palate.

Using the Weingardt plier, insert one side of the NPE in the lingual sheath

Opening the Weingardt plier to grab the mesial NPE hook and the very ….

Distal edge of the lingual sheath—squeeze together—NPE will fully seat.



Make sure the distal leg of the NPE is sticking out of the lingual sheath.

Using the Weingardt plier, insert the opposite side of the NPE…….

This will allow you to incorporate the entire arch, if needed.

The pressure of the NPE is already making space between the centrals.

NPE inserted and adapted.

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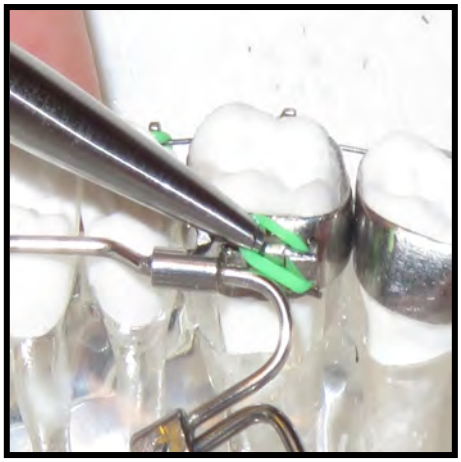
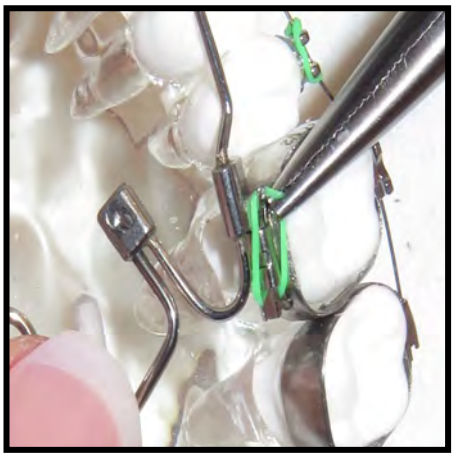
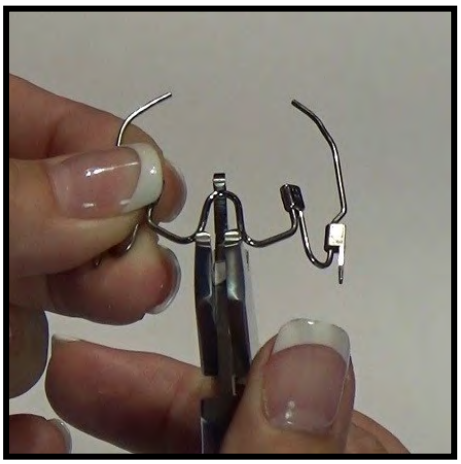


Tie in the NPE using glide-ties. Hook the distal leg of the NPE.



Stretch the glide-tie to the mesial hook on the NPE.

Completed NPE.



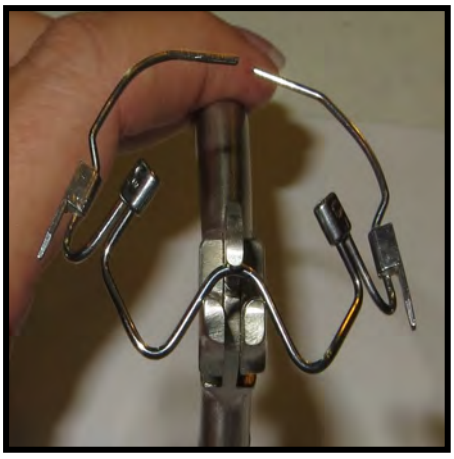
If extra expansion is needed, the NPE can be adjusted to expand more.

Nitanium Palatal Expander (NPE) Adjusting Plier—View 1.

Nitanium Palatal Expander (NPE) Adjusting Plier—View 2.

Nitanium Palatal Expander (NPE) Adjusting Plier—View 3.

1st bend is made in the center which will widen the NPE.



When this is done, the arms become flared out.

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Shown is expansion from original width, with flared arms.

2nd bends will be done on the 2 sides to align the arms again.

Make sure this is done on each side.

Shown is expansion from original width, with arms realigned.

Shown is the amount of expansion achieved.

Re-insert the NPE and tie in, same as before. spray may be needed again.

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Exercise 5

Fixed Removable Lingual Arch (FRLA)

Pre-Fabricated

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Fixed Removable Lingual Arch (FRLA)

Pre-Fabricated

Purpose:

- Maintain the space obtained in Phase I treatment
- Prevents the molars from moving mesially when the deciduous teeth exfoliate
- Prevents incisors from moving lingually causing loss of arch length
- Can be used for anchorage for certain appliance, if needed
- If Phase II treatment is needed, increases the possibility of the patient returning to your practice

Instruments & Materials Needed (Prior to Start of Class):

- Band Pusher/Scaler
- Hollow Chop Plier
- Mathieu Plier– Hook Tip & Wide Tip
- Pin & Ligature Cutter
- Three Prong Plier
- Weingardt Plier

Materials Provided:

- Pre-Fabricated Lingual Arch
- .012 Long Ligature Wire

NOTES:

- A FRLA can be used on the upper arch, if needed, for anchorage when retracting teeth after the MDA.
- If using the FRLA for short term use, using glide-ties is acceptable. Otherwise, metal ligature ties is the appropriate method since the appliance may stay in long term.

Directions:

Fixed Removable Lingual Arch (FRLA) Kit

Prefab FRLAs come in 4 sizes 1-4. Used as retainers or for anchorage.

When used as retainers, prior to insertion, heat treat the corners.

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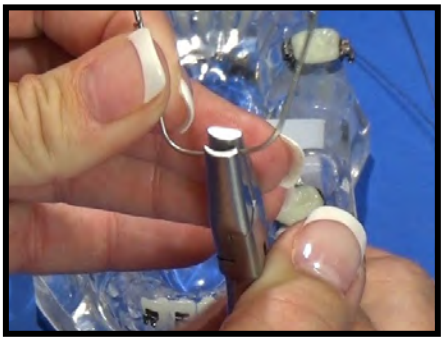
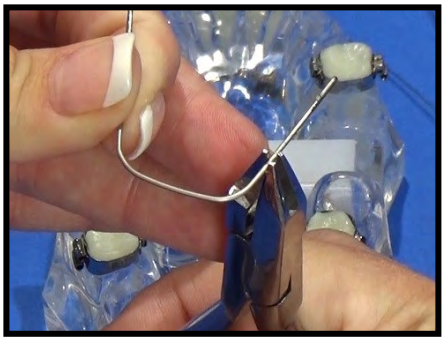
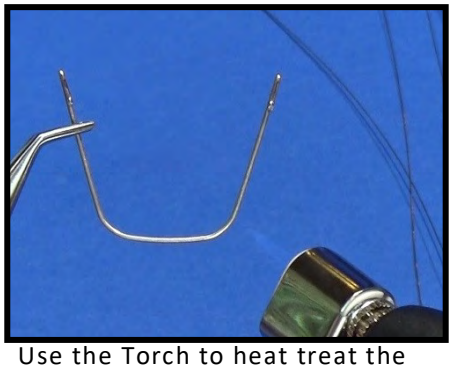
Sizing, must touch anterior teeth & hook is mesial of 1st molar sheaths.



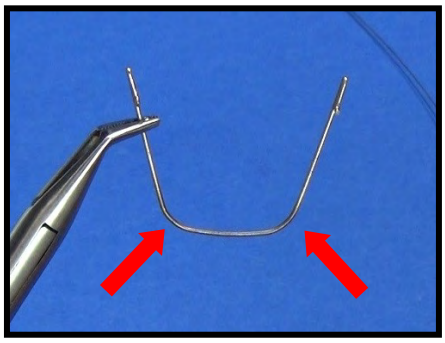
If adjustments are needed, use the Hollow Chop Plier to form the anterior portion.



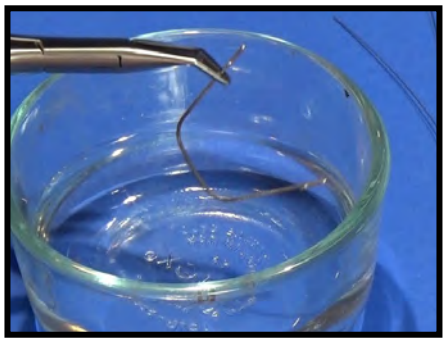
The Three Prong Plier can also be used to make adjustments.



Use the Torch to heat treat the anterior portion.



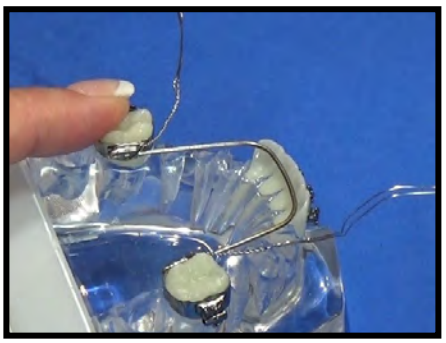
Once heat treated, it will have a 'straw' color appearance.



Quench the FRLA is water to set.

Squeeze appliance into place, FRLA should stick out distal of sheath.

Insert opposite side in the same manner.



Use Metal ligatures to tie the distal cleat & the mesial FRLA hook. Twist firmly until it is snug against the band.

Clip, then tuck Using the Band Pusher, push the 'pigtail' where it is not poking.

Notice the position of the anterior portion of the FRLA. Should be more gingival than occlusal.

Shown is the FRLA tied in using metal ligatures.

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Exercise 6

Utility Archwires (UAW) for Mixed Dentition

Bending Your Own– .016 x .022 Stainless Steel

Basic Course

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Utility Archwires For Mixed Dentition (UAW)

Bending Your Own– .016 x .022 Stainless Steel

Purpose:

- Made for patients
  - that constantly break the Pre-Fab UAW
  - there is not a size that fits
  - needs a sturdy wire for an appliance (Twin Force, MDA, etc)
- Treat patients with mixed dentition - Phase I or Early/Transitioning into Phase II
- Align the anterior teeth
- Advance the anterior teeth, if needed
- Close space in the anterior teeth
- Rotate the maxillary molars, if needed (TOE-IN)
- Open the bite by intruding the anterior teeth, if needed (TIP BACKS)

Instruments & Materials Needed (Prior to Start of Class):

- 3mm Utility Arch Step Plier
- Arch Markers
- Elastic Remover
- Distal End Cutter
- Heavy Duty Wire Cutter
- Mathieu Plier– Hook Tip & Wide Tip
- Ultimate Hook Crimping Plier
- Weingardt Plier

Materials Provided:

- .016 x .022 Stainless Steel Archwires – Upper & Lower
- 1/4” -Medium Elastics
- Ultimate Hooks
- Glide-Ties

NOTE:

As shown and explained in Exercise 4, all the capabilities that come with the Pre-Fabricated UAW can be used on this handmade wire, such as:

- Tip Backs
- Toe In
- Advancement Bends

Directions:

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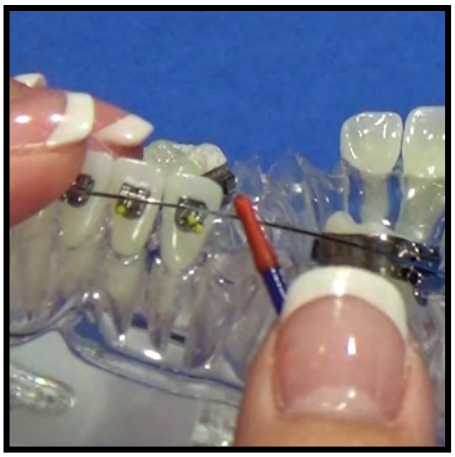
LOWER UAW - MEASURING INTRAORALLY

Use a 3mm Utility Arch Step Plier. Bend a UAW from 16x22/Stainless Steel Archwire.

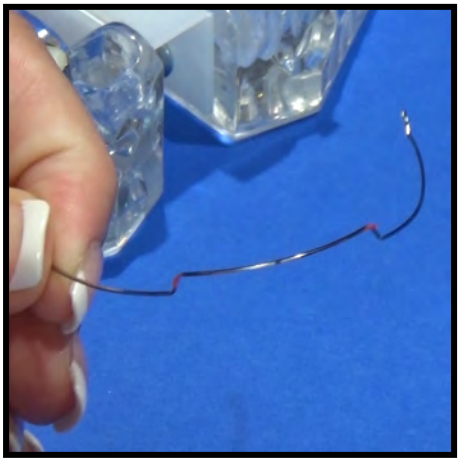


Make a mark distal to the laterals.

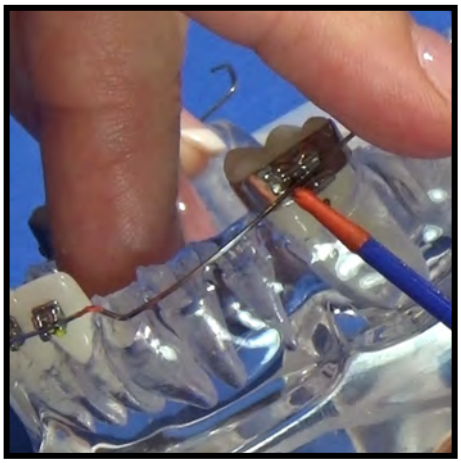
Align the plier to create the appropriate step up or step down. This will create a step down in the wire.

Place the center of the plier (where the step will be made) on the mark.

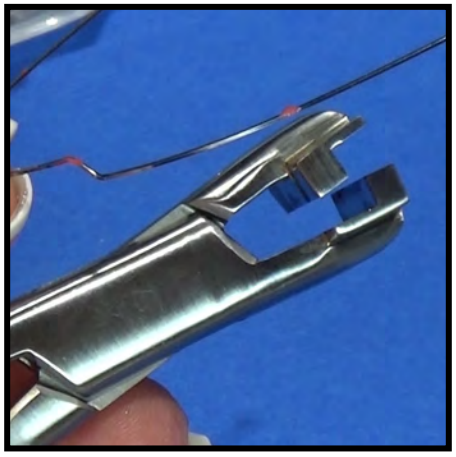
Squeeze firmly to ensure a crisp bend.



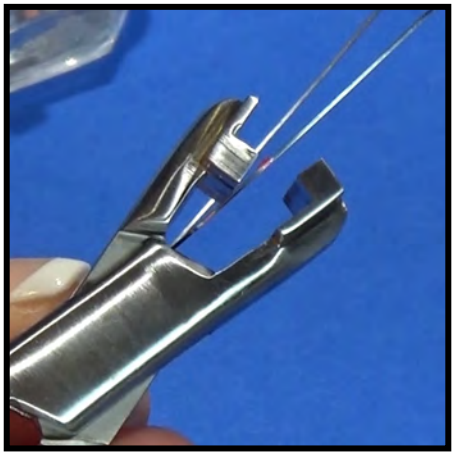
Shown are the anterior steps created. These should be done first.



Now make a mark mesial to the 1st molars.



On the same side of the arch, flip the plier over to get the mirror image.



Shown is the mirror image of the anterior mark.

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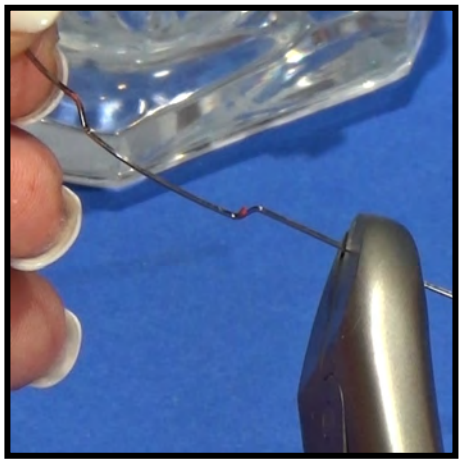
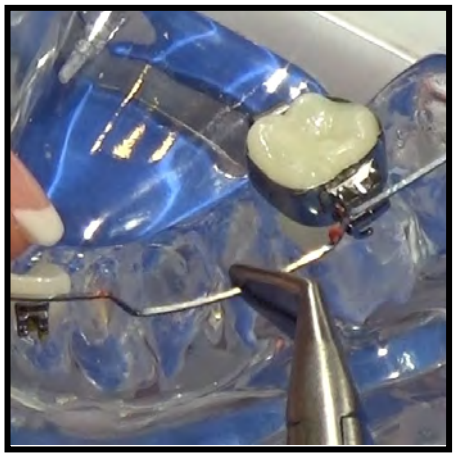
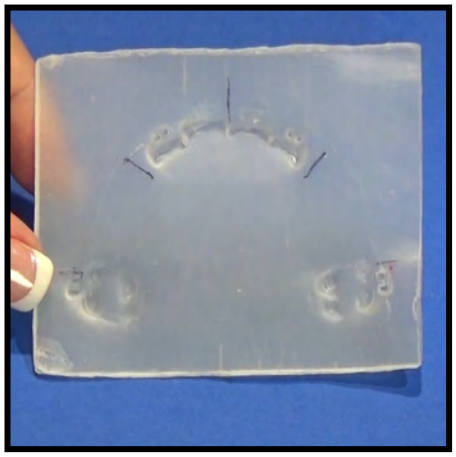


Once the posterior bends have been created, cut the excess wire, using a Heavy Wire Cutter.

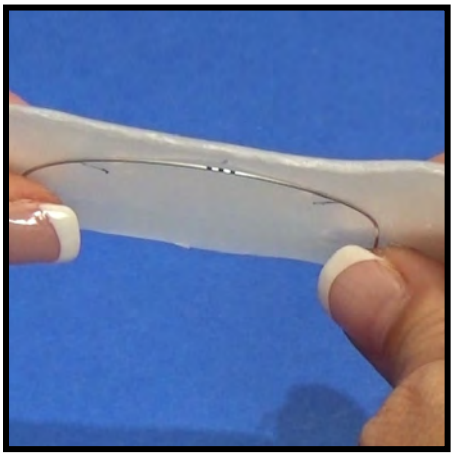


Insert the lower wire into the wire slots. UAW that have been made do not need ties over the molar hooks holding it in place.

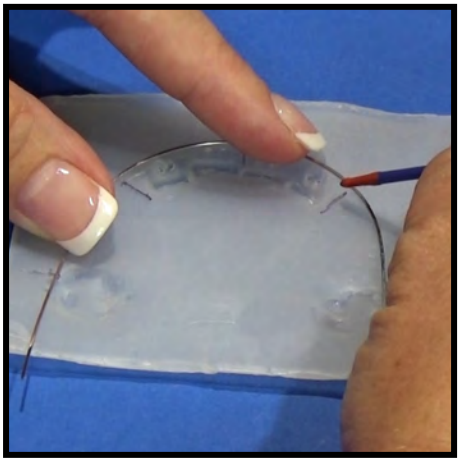
UPPER UAW - MEASURING WITH A WAX PATTERN



Make a wax pattern and identify the MIDLINE and DISTAL to the LATERALS.

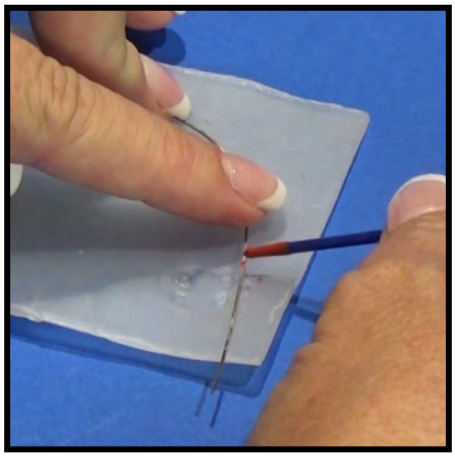


Line the midline mark on the wire with the midline mark on the wax pattern.



With midlines lined up, mark the distal of the laterals on the wire.

Using the step plier, make the anterior bend on both sides.



Place the wire back on the wax pattern and mark the wire mesial to the 1st molar bands.

Flip the plier over for the mirror image and make the posterior bends on each side.

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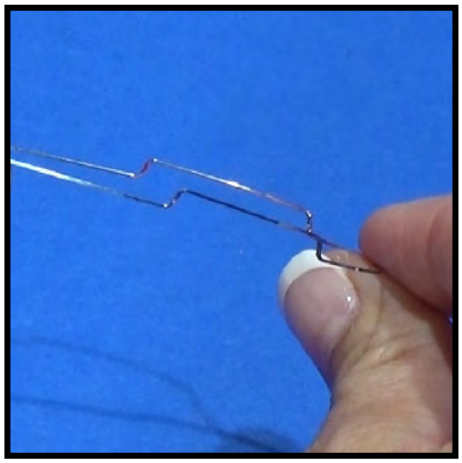
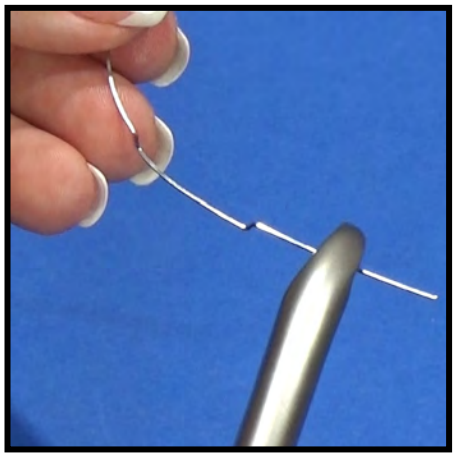


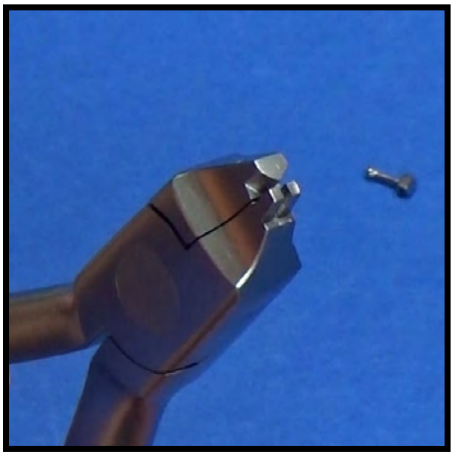
Handmade, fabricated UAW.



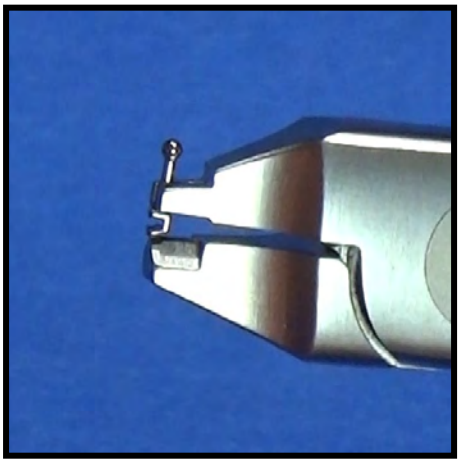
Use the Heavy Duty Wire Cutters to remove any excess distal wires.

Insert the wires and tie in. Use the Distal End Cutters if more wire needs to be cut intraorally.

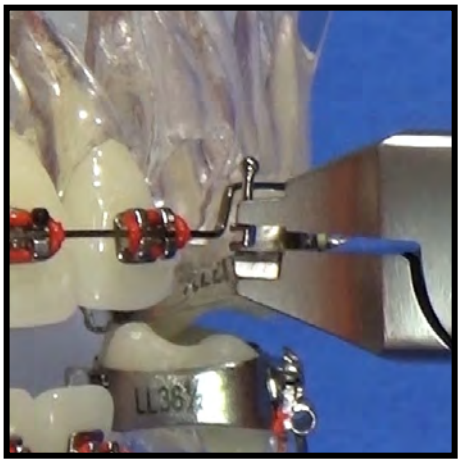
Completed Exercise.



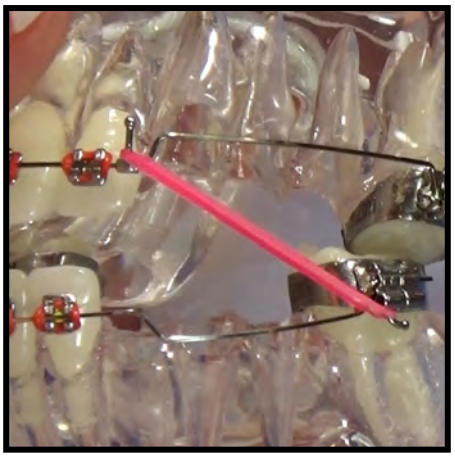
Ultimate Hook Crimping Plier



Ultimate Hook



Crimpable hooks are placed for elastics to correct Class II or Class III.



Class II correction using medium or light elastics.

Completed Exercise.

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Exercise 7

.012 and .014 Nitinol Archwires

Rotation Wedges (RW)

Basic Course

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.012/.014 Nitinol Archwires

Rotation Wedges

Purpose:

- .012 Nitinol is first wire placed in Phase II Treatment
- Welcoming patient to orthodontics
- .014 Nitinol is second wire placed and is the ideal wire for use with Rotation Wedges (RW)
- De-rotating Teeth
- Minor mesial-distal movement
- Light force wires, which acquaints the patient with initial tooth movement

Instruments & Material Needed (Prior to Start of Class):

- Band Pusher/ Scaler
- Distal End Cutter
- Elastic Remover - Explorer
- Heavy Duty Wire Cutter
- Ligature Remover/Director
- Mathieu Plier- Hook Tip or Wide Tip
- Pin and ligature cutter
- Weingardt Plier

Materials Provided:

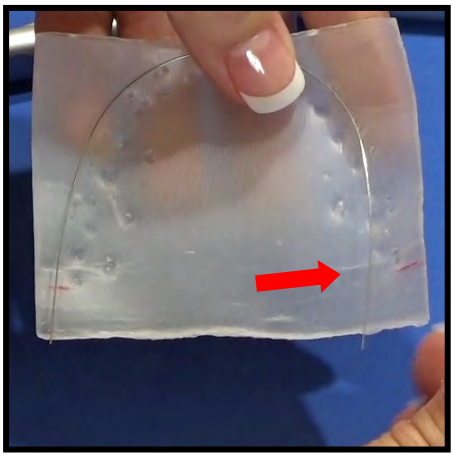
- .012 Nitinol UPPER archwire
- .014 Nitinol LOWER archwire
- Beeswax
- Glide-Ties
- .010 Shorty Ligature Wires
- Rotation Wedges

NOTE: Rotation wedges work on light flexible archwires, like .012, .014 and .018 Nitinol, as the distortion and the memory of the archwires achieve ideal rotation.

Directions:

.012/NT (UPPER): First wire used in Phase II Treatment.

May use beeswax to create an impression to size your first wire.



Mark distal of the molars and cut with a Heavy Duty Wire Cutter.

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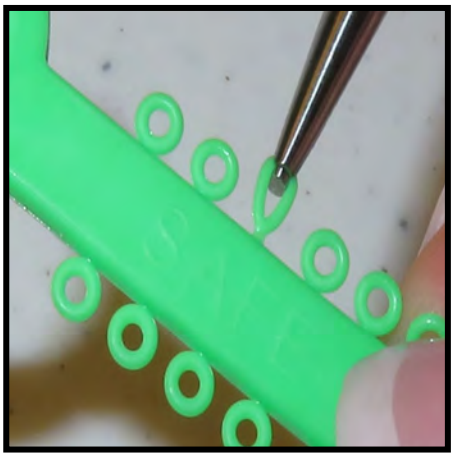
.012/NT - UPPER

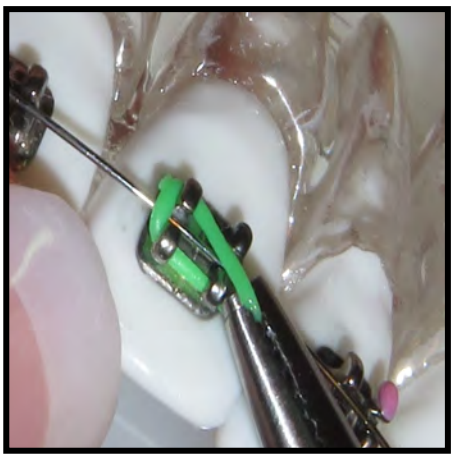
Using the Hook Tip Matthieu,

Grab the edge of the glide-tie only. This will make room in the center.

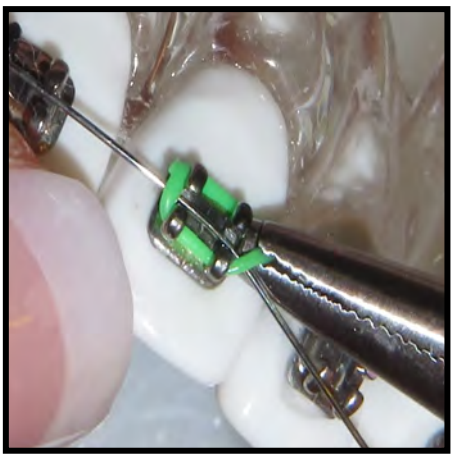


Before clicking the Mathieu closed, pull on the glide-tie.

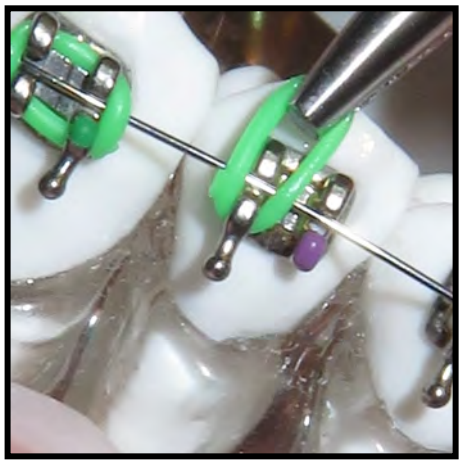
Use your finger or fingernail to start at any tie wing.



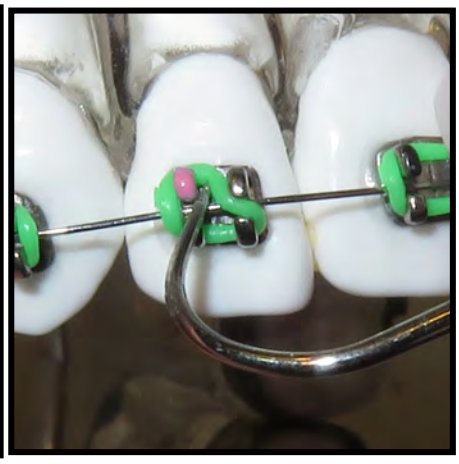
Stretch the tie down or up to the opposite tie wing, then over to the...



3rd tie wing, then ROLL the plier up and over to the 4th tie wing.



TIP: when there is a power arm on a bracket, use that first.



This happens often, go back and use an explorer to get it over the 4th tie wing.

Use the Distal End Cutter to cut any excess wire.

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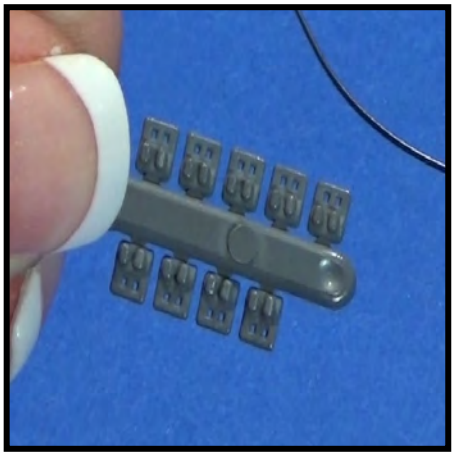
Slide the plier mesially until it is flush against the distal of the

Then clip the extra wire. Make sure you come out with the wire.

.014/NT - LOWER

.014/NT (LOWER): Best wire to use for Rotation Wedges (RW).



Rotation wedges are used to de -rotate teeth.

Using a Matthieu, hold in the 'valley' of the rotation wedge.

Place a rotation wedge on distal of LL1.

Place a rotation wedge on the distal of LL5.

Insert the .014 Nitinol wire in the lower arch using a Weingardt Plier.

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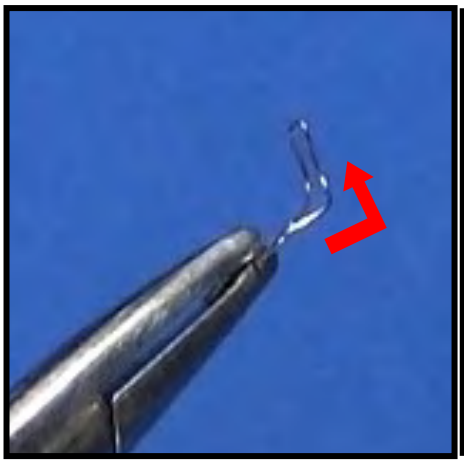
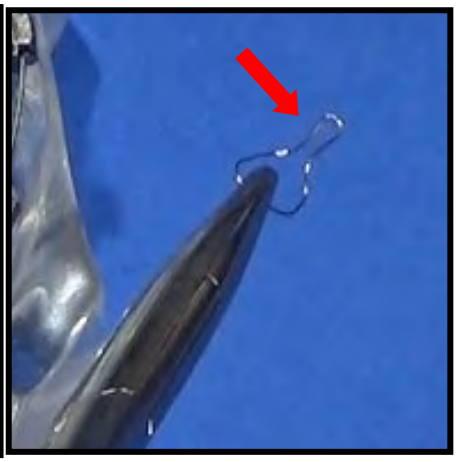
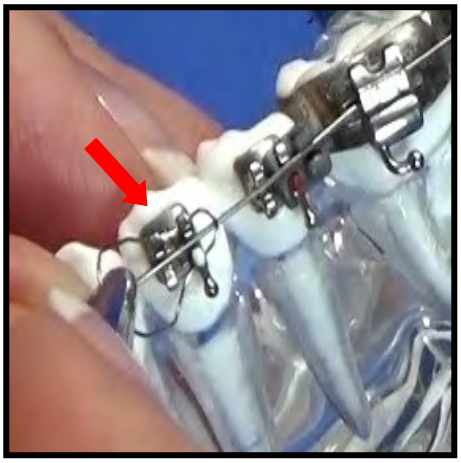
Great storage for the Shorty Twist Ties and Rotation Wedges (RW).



Make sure to grab the pigtail, then bend the tie at a 90° angle.

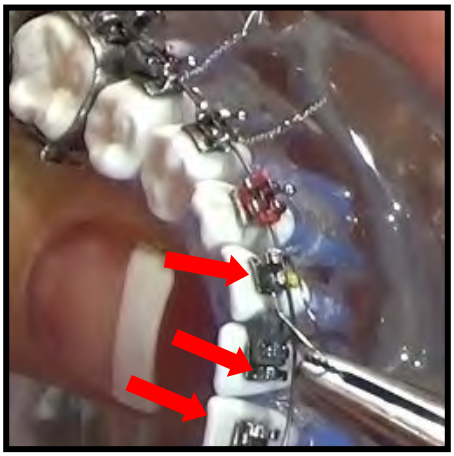


Then squeeze the end of the shorty tie together with your fingers.



Using your shorty ties, tie in the adjacent teeth, except on molar bands. Tie the entire bracket.

Only **tie in the opposite tie wings** of the rotation wedge, **not the** entire bracket.



Again, tie in the adjacent teeth to the rotation wedge on LL1 and tie in the mesial tie wings only on LL1.

With the Pin & Ligature Cutter, clip the pigtails of all the shorty ties.

With the Band/Pusher Scaler, tuck the pigtails under the wire. Cut any distal ends that are long.

Completed exercise with an UPPER .012 Nitinol & LOWER .014 Nitinol archwire with Rotation Wedges (RW).

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Exercise 8

.018 Nitinol Archwires

Leveling the Curve of Spee with Figure 8's

Basic Course

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.018 Nitinol Archwires

Leveling the Curve of Spee with Figure 8's

Purpose:

- Continues to level, align, and rotate the teeth
- Begins to open the bite
- Starts to get a good arch form
- Understanding how to figure 8

Instruments & Material Needed (Prior to Start of Class):

- Distal End Cutter
- Elastic Remover
- Heavy Duty Wire Cutter
- Pin & Ligature Cutter
- Mathieu Plier– Hook Tip & Wide Tip
- Weingardt Plier

Materials Provided:

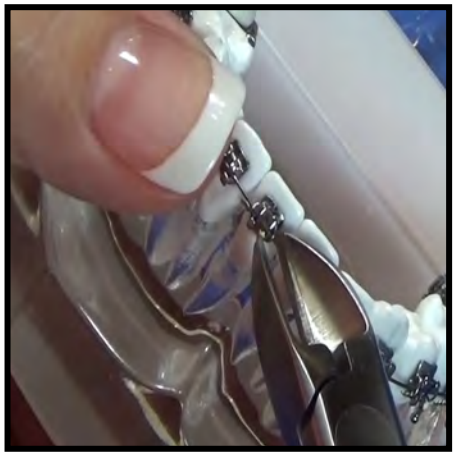
- .018 Nitinol Archwires
- Glide-Ties

Directions:

REMOVING GLIDE TIES AND METAL TIES

Typodont from previous exercise.

Use an Explorer to remove the glide ties by inserting it by the tie wings.



Use a Pin & Ligature Cutter to cut the metal ties at the corner of the wire and the bracket.

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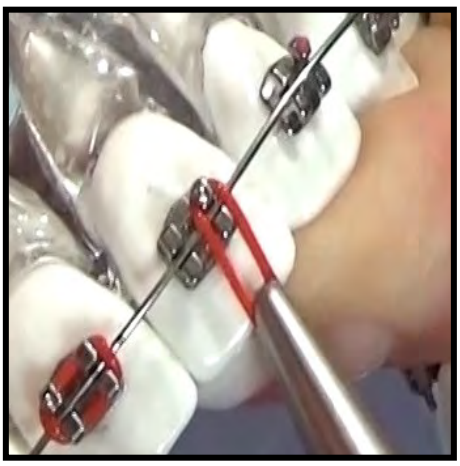
Instead of cutting the metal ties, untuck the 'pigtails' and untwist them to loosen and remove.

Remove the wires, then remove the Rotation Wedges by using a Flat Tip Matthieu Plier

Using an Explorer can be used to remove Rotation Wedges as well. Similar to removing ties.

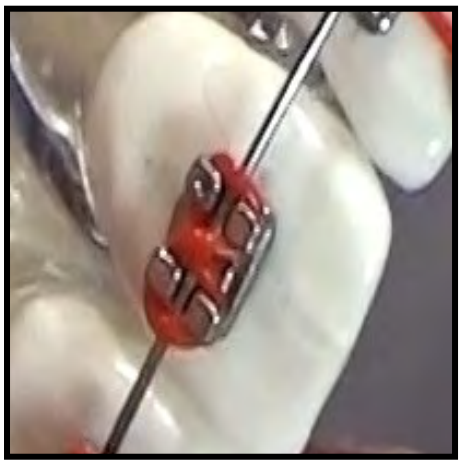
.018/NT WITH FIGURE 8's



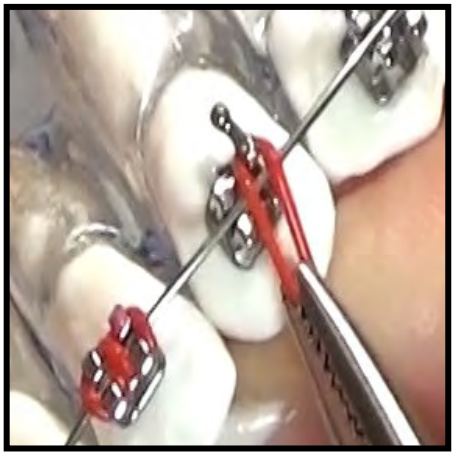
Use your finger or fingernail and start at any tie wing.

SWING SIDEWAYS to catch the opposite 2 tie wings at the same time.

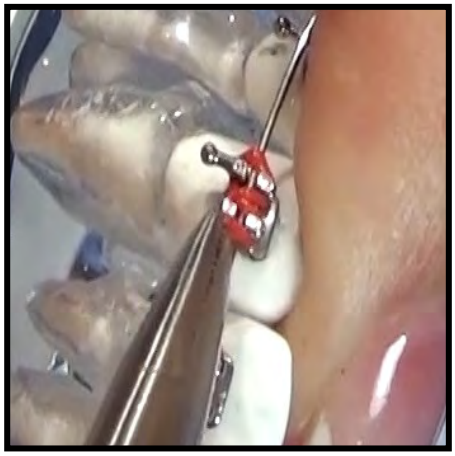
ROLL the plier up and over to catch the 4th tie wing.



Make sure it is fully engaged on the 4th tie wing.



TIP: when there is a power arm on the bracket, use that first.



Following the same steps.

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Using the Distal End Cutter, cut flush to the distal of the molars.

Check & verify that the cut wire is not left in the patient's mouth.

Upper arch tied in with Figure 8s.

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Exercise 9

.020 Stainless Steel Archwires*

A. **Open Coil Spring (OCS)**
Opening Space

B. **Accentuated Curves & Reverse Curves (AC/RC)**
Opening Deep Bites

C. **Step In & Step Out Bends**
Correction of Scissor Crossbites

Basic Course

* The .020 Stainless Steel Archwires are part of the Williams Straight Wire Series. If none of the above conditions apply, place wire as is.

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.020 Stainless Steel Archwires

A. Open Coil Spring (OCS)

Purpose:

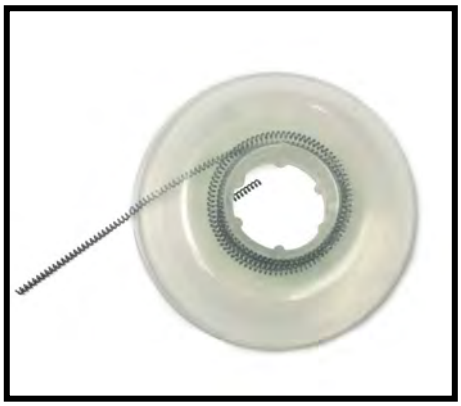
- Opens space for blocked out teeth—ACTIVE
- Holds space for an erupting tooth—PASSIVE
- Can be used unilateral or bilateral
- Understanding the use of the V-Stop Plier

Instruments & Materials Needed (Prior to Start of Class):

- Arch Markers
- Band Pusher/Scaler
- Distal End Cutter
- Elastic Remover - Explorer
- Heavy Duty Wire Cutter
- Ligature Remover/Director
- Mathieu Plier– Hook Tip & Wide Tip
- Pin and Ligature Cutter
- Weingardt plier
- “V” Band Stop Plier

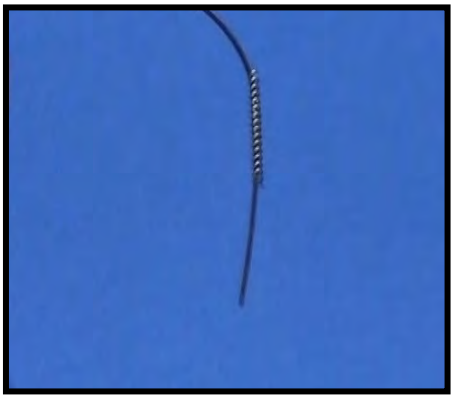
Materials Provided:

- .020 Stainless Steel Archwires
- Open Coil Spring – Nitinol (.010 x .030 Lumen)
- .010 Shorty Ligature Wires
- Ultimate Crimpable Stops
- Glide Ties



Open Coil Spring—Nitinol .010 x .030.

To measure for an ACTIVE spring, measure the space + 1 bracket width.



Slide the spring on the wire.

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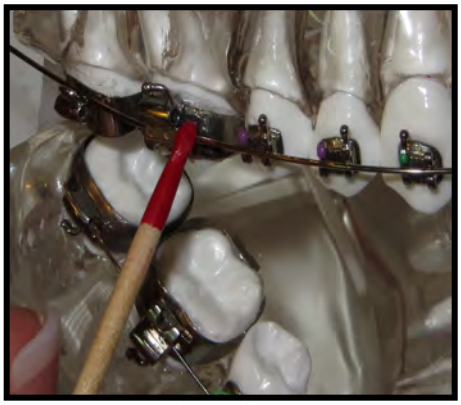
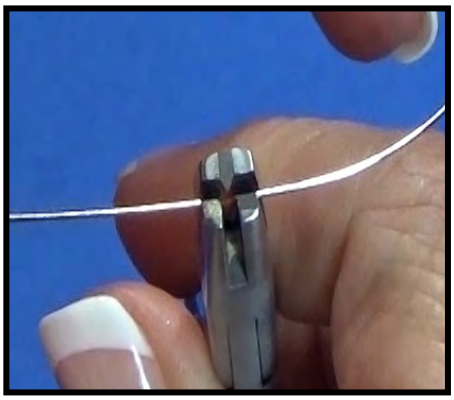
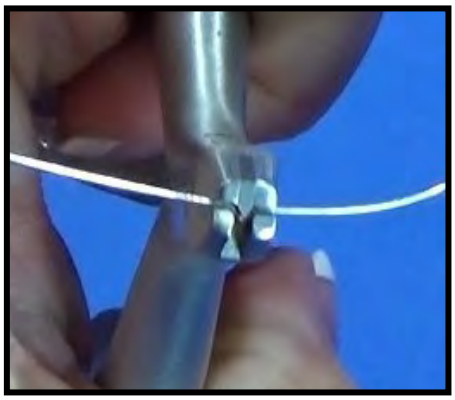


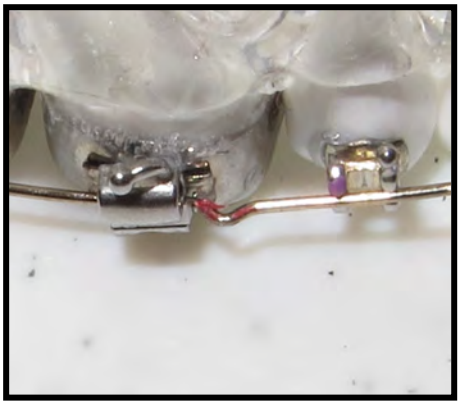
Make a mark on the wire mesial to the 1st molar tube.



Using a “V”-Stop plier, place the point of the plier on the red mark.



Squeeze tightly to create the V-Stop in the wire.

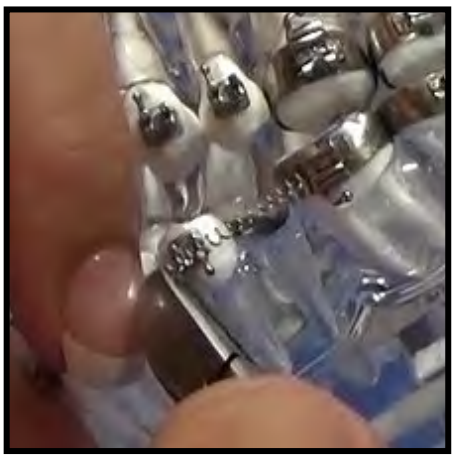


Insert the wire and make sure the stop is flush with the 1st molar.

With the OCS on the wire, metal tie the most posterior bracket first, UL3.

Pull the OCS back to engage & tie in the UL1.

UL1 & UL3 tied in with shorty ties. **ACTIVE** Open Coil Spring—Nitinol .010 x .030.



Again, measure for an **ACTIVE** OCS with the space + 1 bracket width.

Slide the spring on the wire. Using a shorty tie, ligate the 4s (1st premolars).

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Follow-up visit: to reactivate OCS, crimpable stops can be added.

Using a Weingardt Plier, flatten the crimpable stop onto the wire.

The OCS is now **ACTIVE** again.

Multiple crimpable spacers can be used to continue to activate OCS.

The OCS is now **ACTIVE** once again using multiple crimpable stops.

Completed exercise with an upper unilateral OCS with a “V” stop and a bilateral OCS on the lower.

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.020 Stainless Steel Archwires

B. Accentuated Curves & Reverse Curves (AC/RC)

Purpose:

- Continues to level and align
- Flattens out Curve of Spee
- Opens bite
- Ability to intrude anterior teeth with or without flaring
- Obtains arch symmetry

Instruments & Materials Needed (Prior to Start of Class):

- Distal End Bender
- Distal End Cutter
- Heavy Duty Wire Cutter
- Hollow Chop Plier
- Mathieu Plier– Hook Tip & Wide Tip
- Weingardt Plier
- "V" Band Stop Plier

Materials Provided:

- .020 Stainless Steel Archwires
- Glide Ties

NOTE: This method to open bites should **never be reversed** to close a bite. The method used to close an open bite is with anterior box elastics.

Directions:

Use the Hollow Chop Plier to sweep curves in stainless steel wires.

Distal End Bender is used to create true intrusion in wires with AC/RC.

Slip this over the distal end of the wire to create 90° bend.

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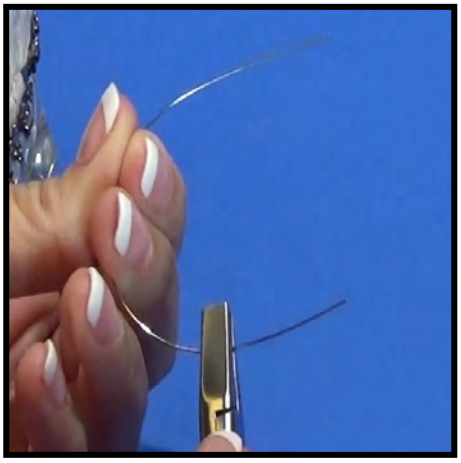
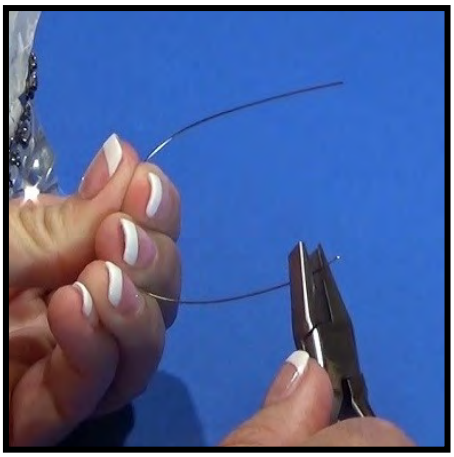
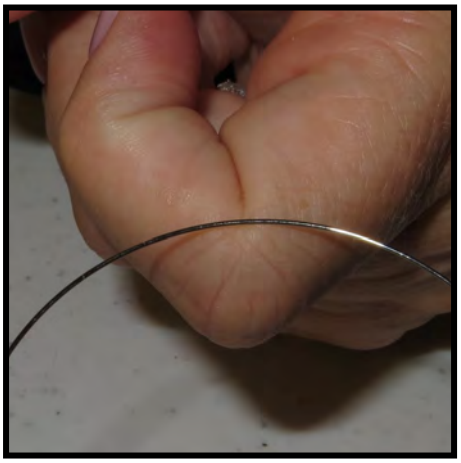


Start at the canine area and curve down to the premolars.



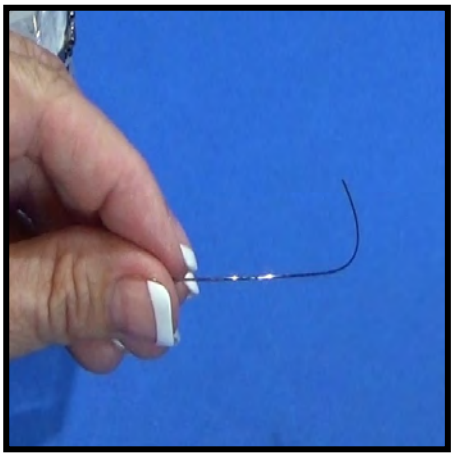
Gently sweep the plier from the canines towards the end of the wire to create a smooth curve.

Repeat for the other side. Make sure the curves are balanced and equal.



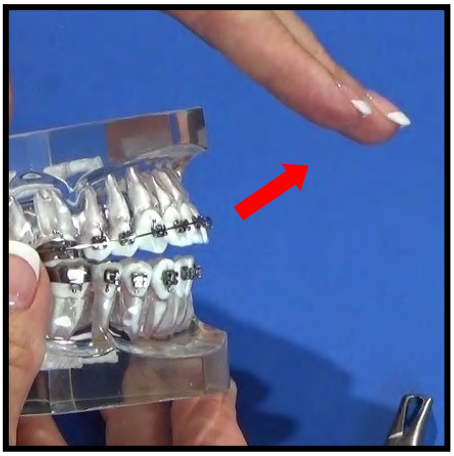
Find the midline mark on the wire.

Hold firmly with one hand while using your fingers or nails to sweep a curve in the wire. Starting at the canine area.



Bends must be equal to one another or the arch may become canted.

Insert the upper wire and notice the wire curving towards the vestibule.



When the wire is engaged and NOTHING else is done, this curve may cause FLARING of the anterior teeth.

To STOP FLARING of the anterior teeth a STOP must be created. Make a mark DISTAL to the 2nd premolars.

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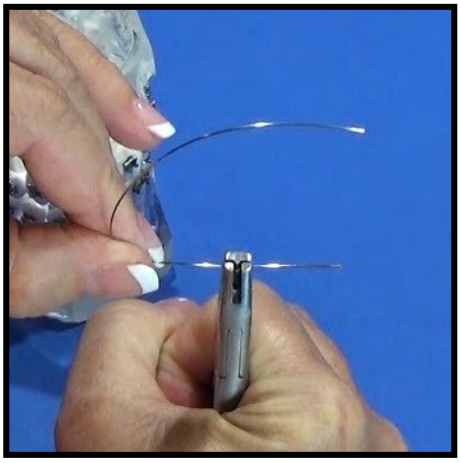
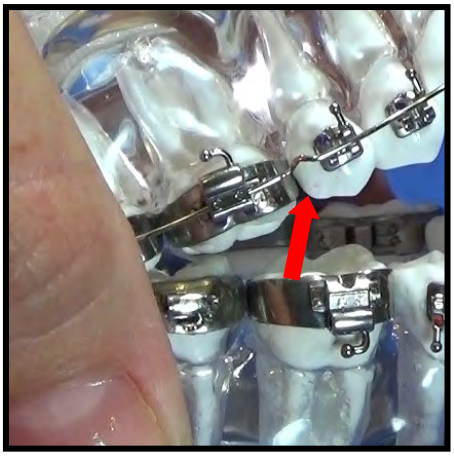


Use the V Stop Plier on the mark just made.



This creates a STOP to prevent the wire from sliding FORWARD creating FLARING.

Another way to STOP the wire from sliding forward is to place a bend distal of the molars using a Distal End Bender.

Leave EXTRA wire to create a 90° bend to STOP the anterior teeth from flaring.

Wire is prevented from sliding forward with this bend in the wire.

These STOPS will cause true intrusion WITHOUT FLARING.

IMPORTANT the wires must always go to the vestibule. Top is a **MEDIUM CURVE,** lower wire is a **HEFTY CURVE.**

Tie in the wires using Glide Ties.

If a DISTAL END BEND was used to stop flaring an additional step must be taken when REMOVING the wire.

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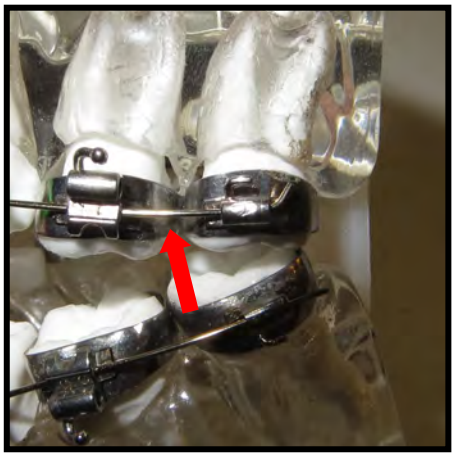

To remove the wire, it must be cut between the molars.

After removing the ties, use the Distal End Cutter to cut the wire between the molars.

The distal segment will have to be removed distally.

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.020 Stainless Steel Archwires

C. Step-In & Step-Out Bends

Purpose:

- Continues forming the arch
- Stainless Steel wires will hold any bend placed which help in lingual or buccal tooth movement that are needed in correction a crossbite on one or more teeth
- When individual teeth are in reverse crossbite (scissor crossbite) it can be corrected with offset bends

Instruments & Materials Needed (Prior to Start of Class):

- Arch Marker
- Band Pusher/Scaler
- Distal End Cutter
- Heavy Duty Wire Cutter
- Ligature Remover/Director
- Mathieu Plier– Hook Tip & Wide Tip
- Pin and Ligature Plier
- Step Plier- ¾ mm
- Weingardt Plier

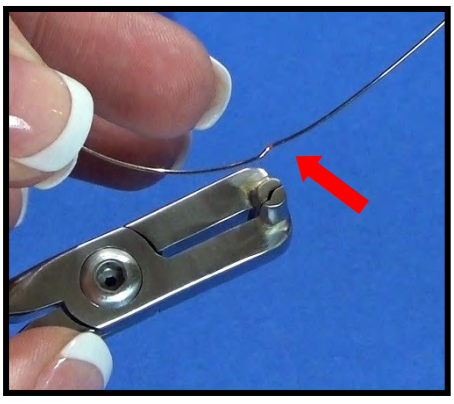
Materials Provided:

- .020 Stainless Steel Archwires
- Glide Ties
- .010 Shorty Ligature Wires

Directions:

UPPER ARCH - STEP IN BEND

UPPER ARCH make a mesial mark to the 1st premolar.



Understanding the plier, make a STEP-IN bend on the mesial mark.

Place the wire over the arch and make a distal mark to the 2nd premolar.

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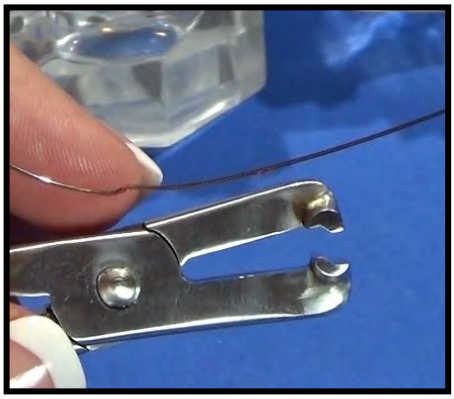
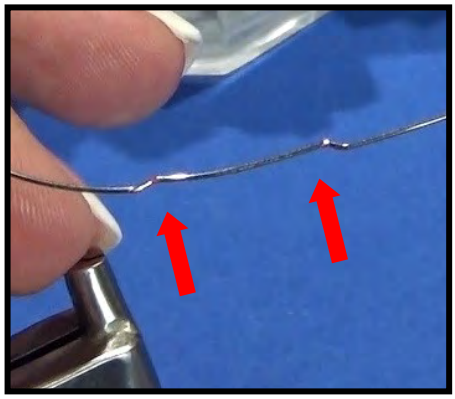


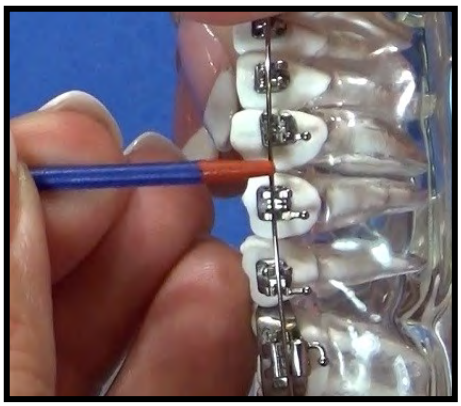
Flip the plier over for a mirror image and create a STEP OUT on distal mark.



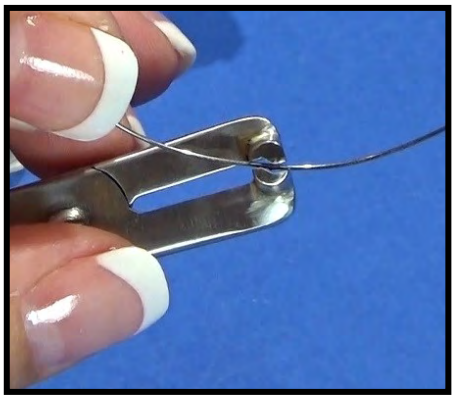
This has create a large STEP IN to push the premolars towards the palate.

Notice the pressure that will be created o the premolars once the wire is seated.

LOWER ARCH - STEP OUT BEND



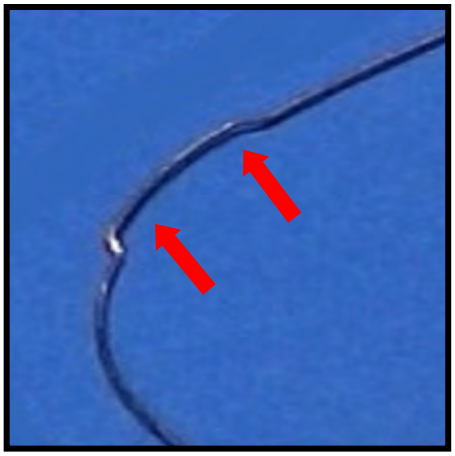
LOWER ARCH make a mesial mark to the 1st premolar.



Create a step out using the step plier.

Place the wire over the arch and make a mark distal to the 2nd premolar.

Flip the plier over for a mirror image and create a STEP IN on distal mark.



This has create a large STEP OUT to pull the premolars towards the buccal.

Shown is what the offsetting bends look like. STEP-IN & STEP - OUT.

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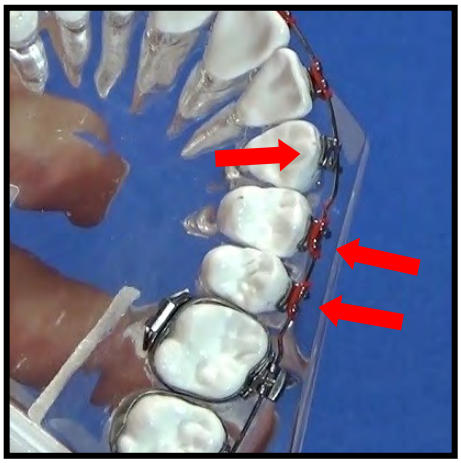
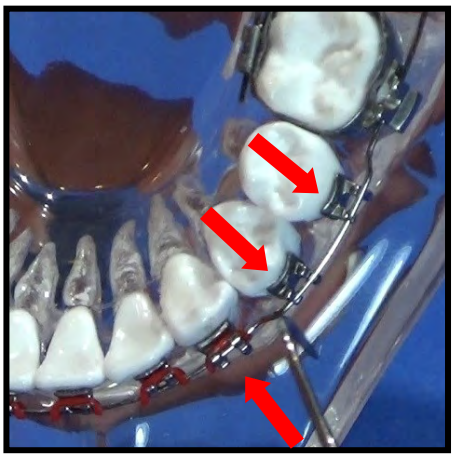
ENGAGING BOTH WIRES



Shown is the wire with the STEP IN to the premolars and the step out to the canine.

Since the wire is NOT engaged into the canine bracket it MUST be tied in with a metal ligature.



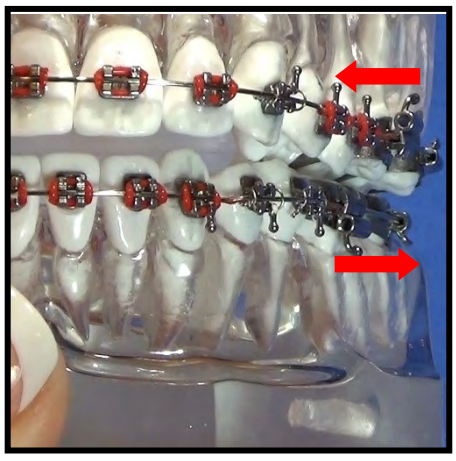
Shown is the wire with the STEP OUT from the premolars and the step in to the canine.

Since the wire is NOT engaged into the premolar brackets they MUST be tied in with metal ligatures.

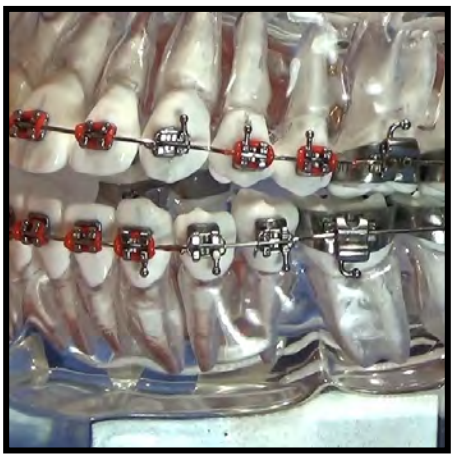
Clip and tuck all 'pigtails' for patient comfort.

Completed upper arch.

Completed lower arch.



Step In and Step Out being used to correct a scissor bite..



Completed Exercise.

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Exercise 10

.016 x .022 Nitinol Archwires*

Level & Align Arches

Basic Course

* At this point in the wire series, it is a good idea to take a pano to check root positioning. If any repositioning needs to occur, this is the optimal wire to use for bracket repositioning.

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.016 x .022 Nitinol Archwires

Level & Align Arches

Purpose:

- Continues the leveling process
- Continues to flatten out the curve of Spee
- Obtains arch symmetry

Instruments & Materials Needed (Prior to Start of Class):

- Distal End Cutter
- Heavy Duty Wire Cutter
- Mathieu Plier—Hook Tip or Wide Tip
- Weingardt Plier

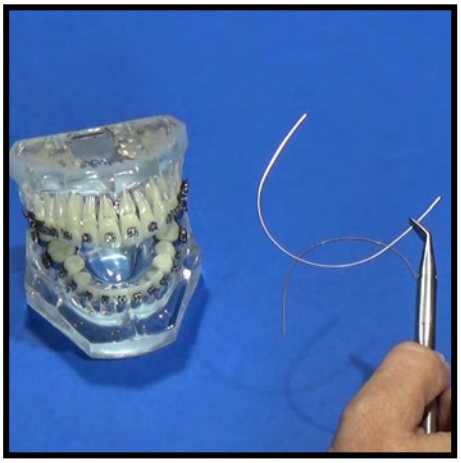
Materials Provided:

- .016 x .022 Nitinol Archwires
- Glide-Ties

Note:

- This step in the wire series can be skipped if the patient is in an .020 Stainless Steel with curves and/or bends that have been placed in that stainless steel wire. If these curves and/or bends need to be duplicated in the next wire, proceed to the .016 x .022 Stainless Steel archwire, if possible.

Directions:



A nitinol wire is extremely flexible and can be used after rebracketing.

Tie the wire in as usual using glide-ties or metal ligatures.

Completed typodont.

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Exercise 11

.016 x .022 Stainless Steel Archwires*

A. **Power Chain (PC) - Short**
Closing Space

B. **AC/RC with Buccal Root Torque (BRT)**
Opening Deep Bites

C. **Individual Root Torque (IRT)**
3rd Order - Correction of Tooth Root

Basic Course

* The .016 x .022 Stainless Steel Archwires are part of the Williams Straight Wire Series. If none of the above conditions apply, place wire as is.

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.016 x .022 Stainless Steel Archwires

A. Power Chain (PC) - Short

Purpose:

- Continue leveling process
- Flattens out Curve of Spee
- Obtains arch symmetry

Instruments & Materials Needed (Prior to Start of Class):

- Distal End Cutter
- Elastic Remover/Explorer
- Heavy Duty Wire Cutter
- Mathieu Plier– Hook Tip & Wide Tip
- Pin and Ligature Cutter
- Weingardt Plier

Materials Provided:

- .016 x .022 Stainless Steel Archwires
- Power Chain (Short) - Full Arch

Directions:

1. Cut and size the archwires then place them in the typodont.
2. Using a Mathieu Plier or your hands place the power chains upper and lower 6-6.
3. Cut the distal ends with the Distal End Cutter.

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.016 x .022 Stainless Steel Archwires

B. AC/RC with Buccal Root Torque (BRT)

Purpose:

- Continues to level and align
- Flattens out Curve of Spee
- Opens bite
- Obtains arch symmetry
- Proper angulation
- Proper inclination

Instruments & Materials Needed (Prior to Start of Class):

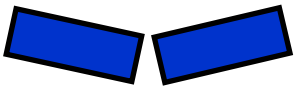
- Distal End Cutter
- Heavy Duty Wire Cutter
- Hollow Chop Plier
- Mathieu Plier– Hook Tip & Wide Tip
- Ribbon Arch Plier (2)
- Weingardt Plier

Materials Provided:

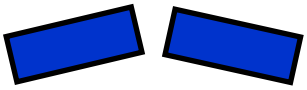
- .016 x .022 Stainless Steel Archwires
- Power Chain (Short) - Full Arch

NOTE:

- Remove the lingual root torque created by the compensating curve with the Ribbon Pliers. This is accomplished by holding the wire with one plier in the cuspid region, grasping the distal end of the wire with the other plier, and twisting the wire 180°. You can see if you have taken out the lingual crown torque by holding the wire at the distal end with one Ribbon Arch Plier and looking at the angle of the wire.



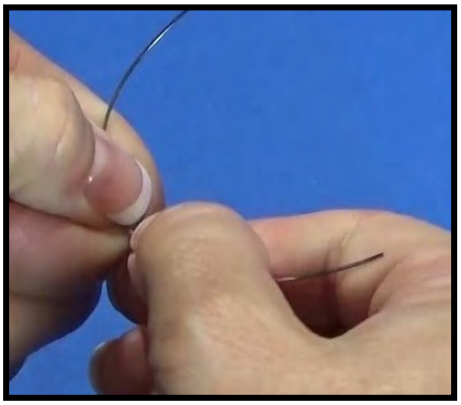
Archwire after AC (Lingual Root



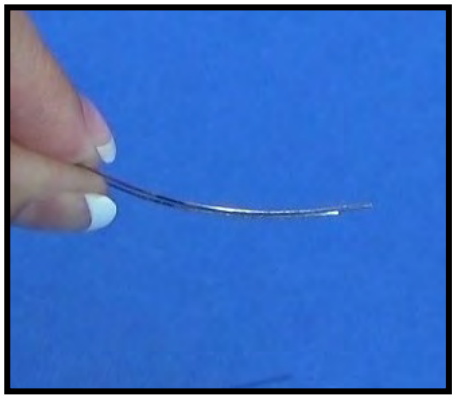
Archwire after De-Torquing

- This method to open bites should **never be reversed** to close a bite. The method used to close an open bite is with anterior box elastics.

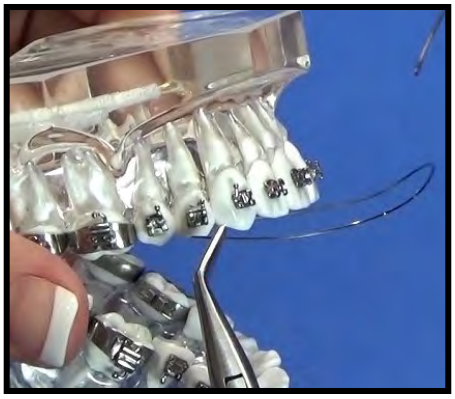
Directions:



Find the midline mark & add AC/RC using your fingers or Hollow Chop.



Make sure the curves are equal.



Place the archwire through the wire slots on the molar bands.

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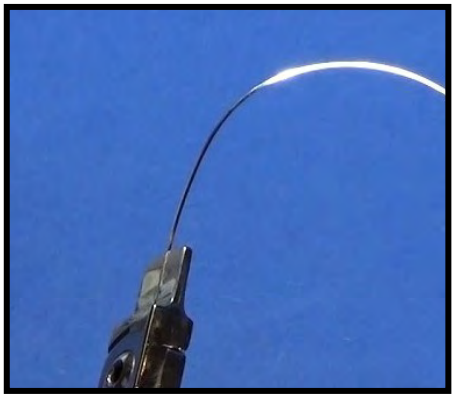
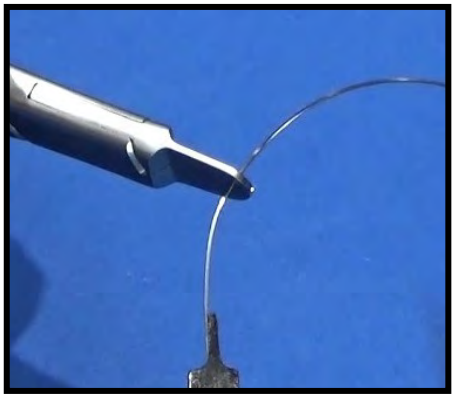
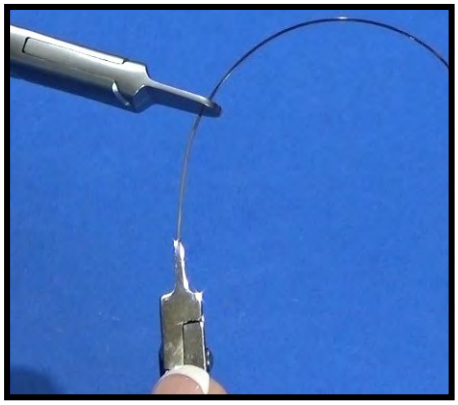
The Ribbon Arch Pliers will be used to add Buccal Root Torque (BRT).



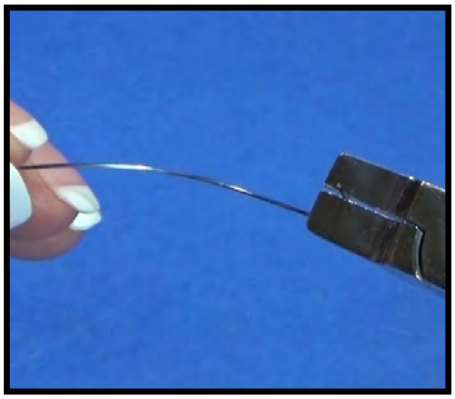
Using one of the Ribbon Arch Pliers, grab the end of the arch-wire.



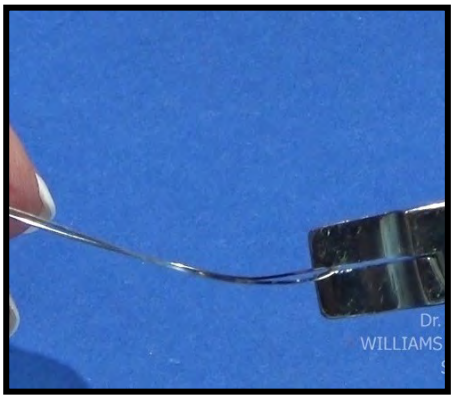
Using the second Ribbon Arch Plier, grab at the canine area.



With a death grip on the pliers, twist the distal leg towards the cheek.



Holding the torqued leg, it is easily seen that the wire is bent buccally.



Holding the anterior portion, the lingual root torque can be seen.

Make sure all curves go toward the vestibules.

Complete exercise using power chain to stop any flaring.

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.016 x .022 Stainless Steel Archwires

C. Individual Root Torque (IRT)

Purpose:

- Maintains level arch while performing IRT
- Maintains the flat Curve of Spee
- Maintains arch symmetry
- To torque the root labially of an initially lingually position tooth

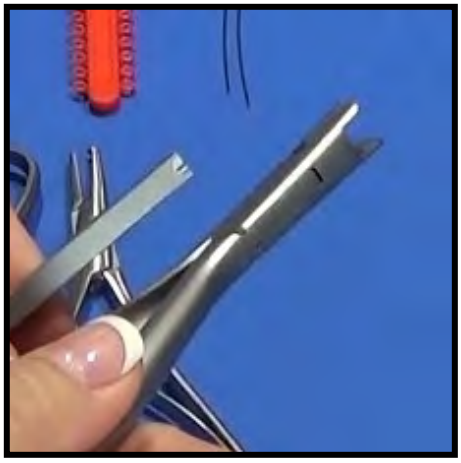
Instruments & Materials Needed (Prior to Start of Class):

- Arch Marker
- Band Pusher/Scaler
- Distal End Cutter
- Heavy Duty Wire Cutter
- Ligature Remover/Director
- Mathieu Plier– Hook Tip & Wide Tip
- Pin and Ligature Plier
- Torquing Plier Set with Key
- Weingardt Plier

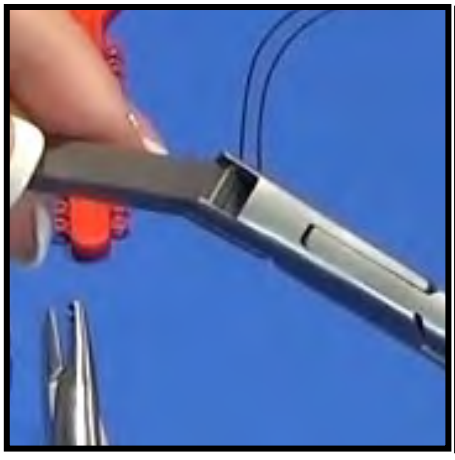
Materials Provided:

- .016 x .022 Stainless Steel Archwires
- Glide Ties
- .010 Shorty Ligature Wires

Directions:



Torquing Plier Set with Key.



Torquing Plier Set with Key.

Wire slot in the key.

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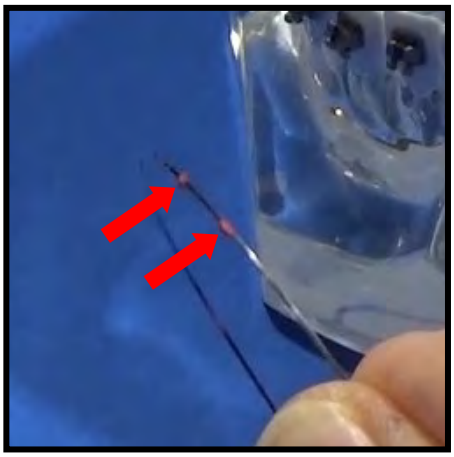
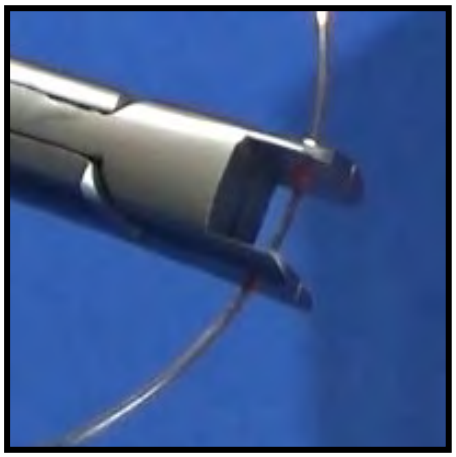
UPPER ARCH: Mark mesial & distal of UL2.



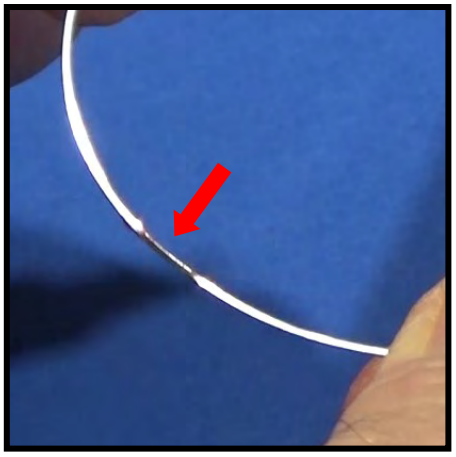
Marked wire where plier will be placed.



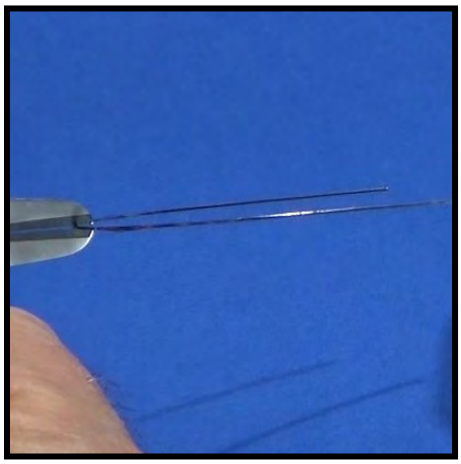
Torquing Plier place on marks using a death grip to hold wire in place.

With a death grip on the plier, insert wire into the .018 end of the key.

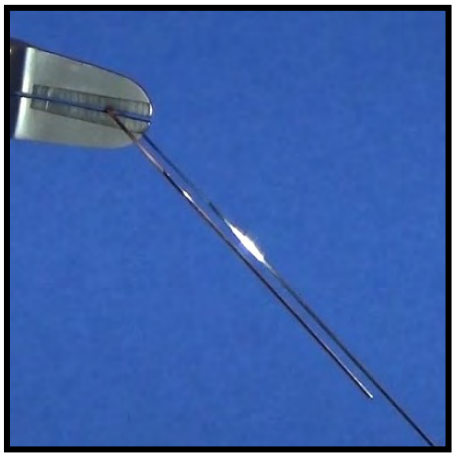
Torque the wire in the direction the root needs to go.



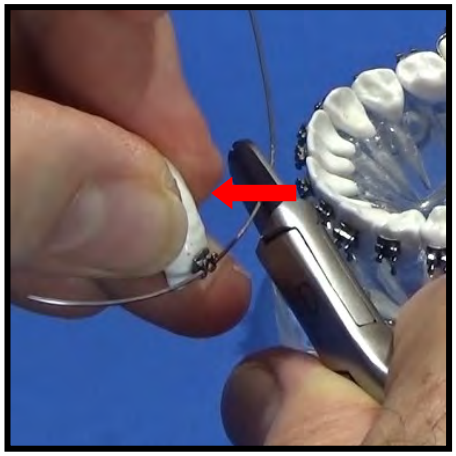
Torqued wire for individual root movement.



Archwire in its normal plane.



Archwire showing the torqued section at approximately 45° angle.



Tooth shown in normal plane on wire (root is more lingual).

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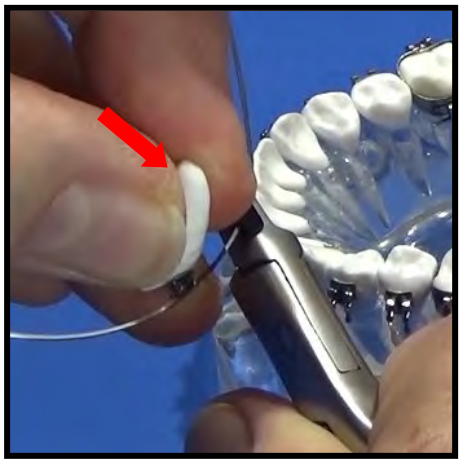

Tooth shown in torqued plane on wire (root is more facial).

Shorty ties must be used to ligate the tooth being torqued.

Patients will feel the pressure when tying in the torqued wire.

Weingardt may be needed to seat the torqued section into bracket.

The adjacent teeth must be ligated with metal shorty ties, as well.

INDIVIDUAL ROOT TORQUE (IRT)

LOWER ARCH: Mark mesial & distal to LL2.

Torquing Plier place on marks using a death grip to hold wire in place.

With a death grip on the plier, insert wire into the .018 end of the key.

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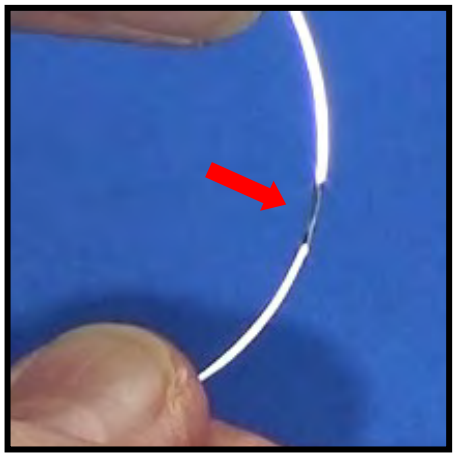
Torque the wire in the direction the root needs to go.



Torqued wire for individual root movement.

Weingardt may be needed to seat the torqued section into bracket.

Safety tie must be used on the tooth being torqued.

Adjacent teeth must be ligated with shorty ties.

Clip all shorty ties.

Tuck all shorty ties under the wire for patient comfort.

Glide ties are optional over metal shorty ties as shown on upper arch.

Clip all distal ends flush for patient comfort.

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Completed exercise.

Phase II– Treatment Plan I (for Class I cases)

- Continue with the .018 x.025 Stainless Steel archwire with power chains (PC) for 2-3 months
- Cross Arch Elastics and Sectionals are made from the .018 x .025 Stainless Steel wire, Leave for 1 month
- Then start the removal process

Phase II—Treatment Plan II (for Class II cases)

- Continue to the .018 x .025 in the lower arch
- Distalization—MDA on the upper with Class II elastics
- Continue the Treatment (SWS) per Treatment Plan II

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Straightwire Series

Reviewing the Case– Basic Course

Class I- Before the Finish

Class II- Before Distilization

Review:

- Through the prior exercises, we have progressed through a straightwire series of archwires and we have employed the straight-wire appliance to level the arches, remove the Curve of Spee, correct rotations, open the bite, correct limited cross bites, open up space for blocked out teeth, achieved mesiodistal tip, labiolingual torque, and attain a broad arch form. We have progressed toward the six keys of occlusion.

- The final archwire in the straight-wire series in Class I mal-occlusions is the .018 x .025 stainless steel archwire. This archwire is left in the arch for 2-3 months to let the periodontal ligaments of the teeth settle in.

- Prior to placing this archwire, it is a good practice to take a panographic radiograph to check root inclinations and in turn bracket positioning.

- If a root is not in an acceptable inclination, the bracket is not positioned properly. Remove the bracket, and then reposition the bracket associated with the tooth, place a .018 nitinol or .016 x .022 nitinol for a month, and then progress back up to the .018 x .025 stainless steel.

- Again, the wire series is as follows for a Class I:
    - .012 nitinol .014 nitinol .018 nitinol .020 stainless steel (AC/RC – TB) .016 x .022 nitinol .016 x .022 stainless steel .018 x .025 stainless steel

    - In a Dental Class I mal-occlusion, after the .018 x .025 stainless steel archwire, you would skip to Exercise 17 (Cross Arch Elastics and Sectionals) and Exercise 18 (Retention). The case should be finished. However in a Class II Dental mal-occlusion, you would progress with the next sequence of exercises. The following exercise is to correct the Dental Class II mal-occlusion and attain the proper molar intercuspal relationship.

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Exercise 12

Multi Distalizing Arch (MDA)-Stainless Steel

Molar Distalizing Appliance

Basic Course

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Multi Distalizing Arch (MDA)

Molar Distalizing Appliance

Purpose:

- Distalize maxillary molars bilaterally or unilaterally
- Distalize mandibular molars bilaterally or unilaterally
- Can be used to move the maxillary or mandibular teeth forward (with no elastics)

Instruments & Materials Needed (Prior to Start of Class):

- Arch Markers
- Band Pusher/Scaler
- Distal End Cutter
- Elastic Remover/Explorer
- Heavy Duty Wire Cutter
- Ligature Remover/Director
- Light Wire Plier (Long Bird Beak)
- Mathieu Plier– Hook Tip & Wide Tip
- Optical Plier (Occulist)
- Pin and Ligature Cutter
- Step Plier—3/4mm
- Weingardt Plier

Materials Provided:

- .016 x .022 Stainless Steel UPPER Archwire (Sectionals for 6s and 7s)
- .018 x .025 Stainless Steel LOWER Archwire
- MDA Appliance
- Power Chain (Short) - Full Arch
- .010 Prefabricated Ligature Wire
- .012 Long Ligature Wires
- Open Coil Springs (OCS) Nitinol - .010 x .045 Lumen
- 1/4” Medium Elastics
- Glide Ties

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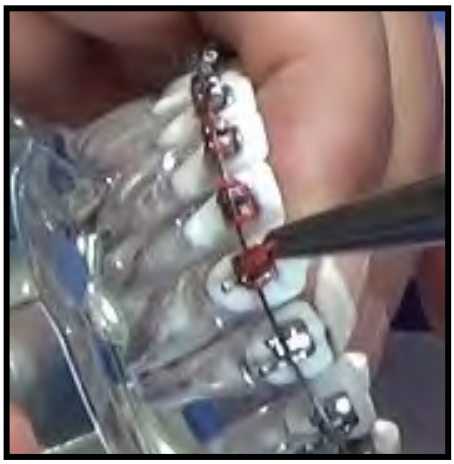
LOWER ARCH

Measure and cut the LOWER .018 x .025 Stainless Steel archwire.

Insert the archwire through the molar tubes.



Tie in the lower archwire using glide ties or a power chain. Glide ties are shown.

Lower arch completed for anchorage during the use of the upper MDA.

This illustration depicts how the lower arch becomes important for anchorage when elastics are used.

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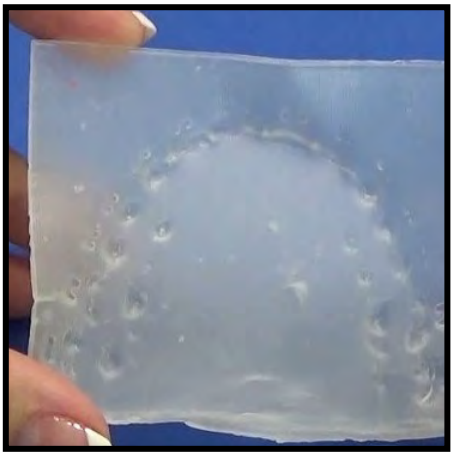
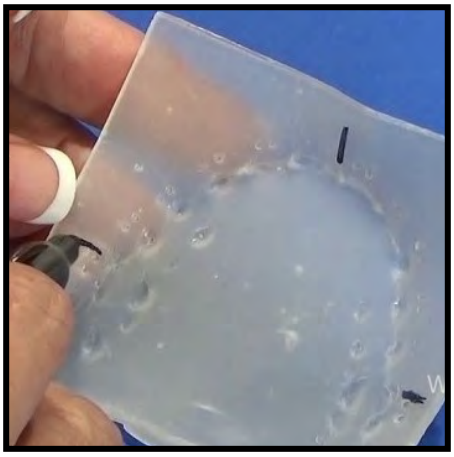
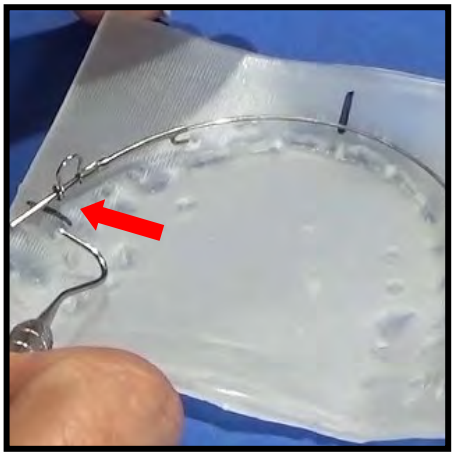
UPPER ARCH



Make a wax pattern of the upper arch. Make sure you can see the edges of the brackets and bands.

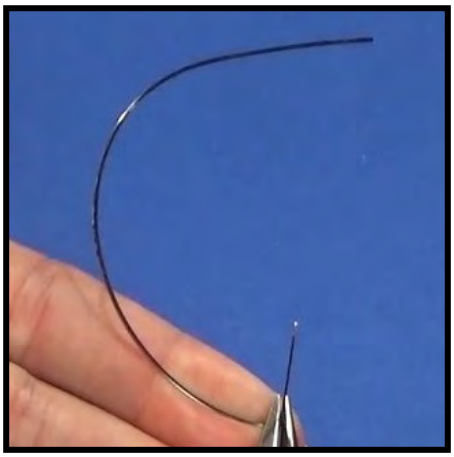


Mark the midline. Mark the mesial to the 1st molar tubes.



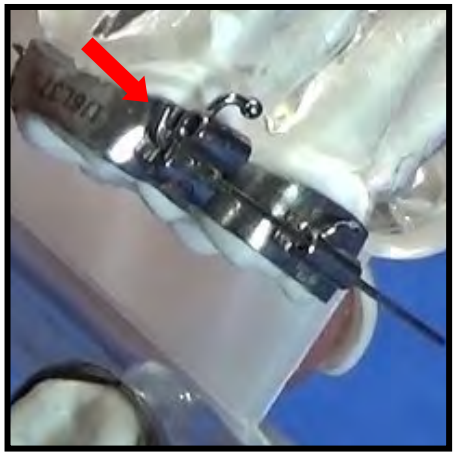
When sizing the MDA, match up the midline marks and the distal of the omega is mesial to the molar marks.

In the upper arch, remove the 2nd premolar teeth on the typodont. On the patient, only remove the brackets.



Make a 90° bend mesial to the 1st molar band.

After the bend, cut the wire leaving ~2-3mm tab, then insert into molars.



Make sure the mesial tab is going towards the gingival.

One option is to place a glide tie around the 1st molar bracket.

This will hold the sectional wire in place during the MDA.

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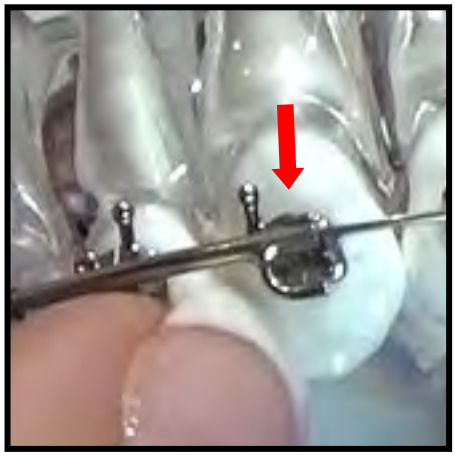
On the other side, the other option is shown. Distal cut the excess wire, leaving ~2-3mm of wire.

Using the Distal End Bender, twist until a 90° bend is created.

This creates a stop so the wire cannot slip out.



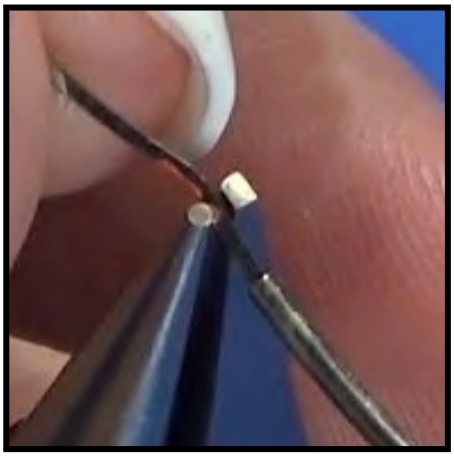
When sizing the MDA, it is very common for the MDA hook to fall at the canine bracket, if erupted.

Using an Arch Marker, on the left & right sides, mark in the middle of the lateral and canine brackets.

Place the Light Wire Plier (Bird Beak) on the mark and pull the distal leg out buccally.

Keep pushing the distal leg out to a 45° angle

Shown is the distal leg pushed out.



Flip you plier over to the distal leg portion, then push the distal leg back into alignment

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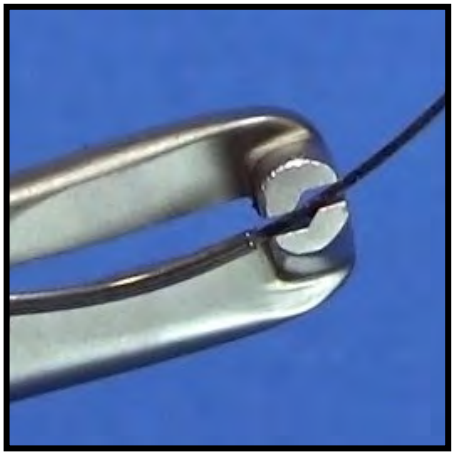
Photo showing the bend towards the lingual.

These bends have a crease “step “ in the wire to bypass the canine bracket.



Another way to create a step in the wire is to use a Step Plier.

This creates the same bend with one movement.

This is the bend created stepping away from the canine bracket.

Cut two 5-6mm sections of Open Coil Spring (OCS) that will be used to activate the MDA.

Slide the OCS on each end of the MDA that will be inserted into the buccal tubes.

In the patient’s mouth, it is recommended to use a tacky agent to keep the wires from falling off.

Place the .012 Long Ligature Wires on each 1st premolar and twist a few times by hand.

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Ligature wires on each 1st premolar, leaving the legs apart like “cat whiskers” so the MDA can be placed.

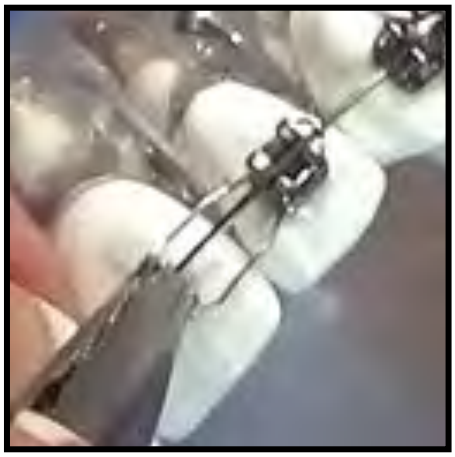
Insert the MDA into the buccal tubes, make sure the springs stay on during insertion.

The spring will slowly compress as the wire is inserted.

This is what the OCS should look like when compressed. This is considered an active spring.

Using the long ligature wire “cat whiskers” cinch back the MDA by tying the wires around the MDA hook.

Using a hook-tip Mathieu Plier, tighten the long ligatures creating a pig-tail to clip & tuck.



Place a shorty tie on the laterals to make sure they do not rotate when a power chain is placed.

Place a Power Chain (PC) 2-2, mesial-mesial, to prevent rotation and keep the 4 anterior teeth together.

Again, end on the mesial tie wings and add a glide tie to the distal tie wings.

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Activate the MDA using a Weingardt Plier and compressing the omega loop to slide the distal leg back.

The Open Coil Spring (OCS) should look like a closed coil spring and be completely compressed.

Another way to active the MDA is to use an Occulist Plier by inserting the half moon side into the omega.

Again, the OCS should look completely compressed.

Patients are instructed to wear Class II medium elastics, two on each side until they return.

Follow up appointments are made every three weeks. Activate the MDA again, change the PC and give the patient more elastics.

The patient should start creating space in the premolar region which is distalizing the molars.

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Exercise 13

Post MDA - SS - .016 x .022 Nitinol

Aligning 2nd Premolars

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Post MDA - SS - .016 x .022 Nitinol

Aligning 2nd Premolars

Purpose:

- Level and align after initial removal of MDA to prepare for the .016 x .022 stainless steel
- Improve angulations of teeth
- Continue to hold Class I molars using Class II elastics

Instruments & Material Needed (Prior to Start of Class):

- Distal End Cutter
- Elastic Remover/Explorer
- Heavy Duty Wire Cutter
- Mathieu Plier– Hook Tip or Wide Tip
- Pin and Ligature Cutter
- Weingardt Plier

Materials Provided:

- .016 x .022 Nitinol Archwires
- Glide Ties
- 1/4" Medium Elastics

Directions:

REMOVING THE MDA

Remove the MDA once over-distalization has occurred. This means almost Class III molars.

Remove the Power Chain (PC) from the anterior teeth.

Clip and remove the shorty ties from the upper laterals.

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Clip and remove the “cat whiskers” from the MDA hook.

Remove the MDA.

Make sure the springs are removed with the MDA.

Remove the glide tie from the 1st molar.

Remove the sectional wire from the molars.

On the side the distal end bend was made, cut between the molars with the Distal End Cutter.

Remove the partial wires from the molars by pushing it out distally and pulling it out mesially.

Replace the 2nd premolars. On the patient, rebracket the 2nd molars.

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COMPLETING THE EXERCISE

Insert the upper .016 x .022 Nitinol archwire.

Tie the archwire in with glide ties. You may opt to figure 8, if needed.

Typodont with .016 x .022 Nitinol completely tied with glide ties. No power chain used at this appointment.

Patients are instructed to continue to wear Class II medium elastics. Only 1 per side at this appointment.

Completed typodont with Class II elastics, 1 per side.

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Exercise 14

Post MDA - SS - .016 x .022 Stainless Steel

Retracting Premolars & Canines

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Post MDA SS – .016 x .022 Stainless Steel

Retracting Premolars & Canines

Purpose:

- Continue to level and align after removal of MDA
- Close spaces in the posterior teeth– 1st and 2nd premolars
- Proper angulations & inclination of teeth
- Proper arch form
- Continue to hold Class I molars using Class II elastics

Instruments & Material Needed (Prior to Start of Class):

- Deluxe Bracket Placer/Slot Aligner
- Distal End Cutter
- Elastic Remover/Explorer
- Heavy Duty Wire Cutter
- Hollow Chop Plier
- Mathieu Plier– Hook Tip or Wide Tip
- Pin and Ligature Cutter
- Ribbon Arch Pliers (2)
- Ultimate Hook Crimping Plier
- Weingardt Plier

Materials Provided:

- .016 x .022 Stainless Steel Archwire– Upper
- Glide Ties
- Power Chain
- Constant Force Nitanium Closing Springs
- Crimpable Hooks
- Crimpable Stops
- Lingual Buttons—Curved
- Super Glue
- Accelerator Spray
- 1/4” Medium Elastics

Directions:

Lingual buttons can be used on extreme distalization cases, seat on the premolars

Placement should not interfere with the occlusion.

Using an explorer, clean off any excess super glue. Let buttons dry while placing archwire.

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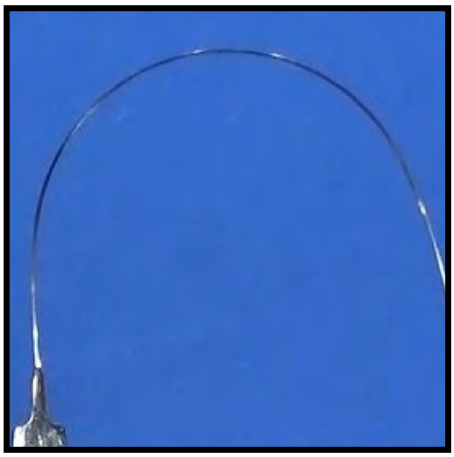
Sweep curves into the upper archwire using your fingers or a Hollow Chop Plier.

Make sure the curves in the wire are bilaterally equal.



Using a Ribbon Arch Plier, grab the distal end of the archwire.

Using the 2nd Ribbon Arch Plier, grab at the canine area.

Twist the distal plier towards the cheek creating buccal root torque.

Insert the wire into the molar tubes.

Make sure the curve goes into the vestibule.

Pictured are crimpable hooks and crimpable stops.

Ultimate Crimping Plier.

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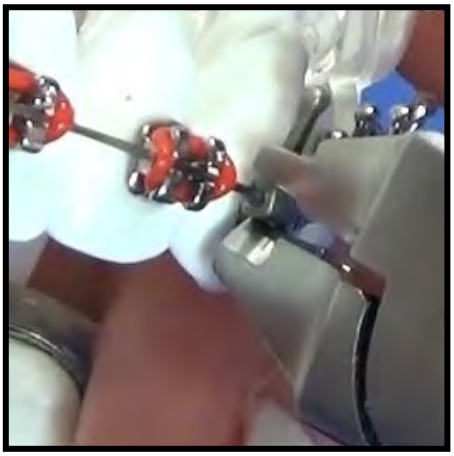
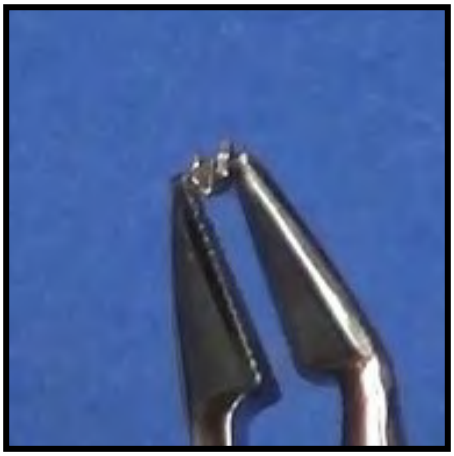
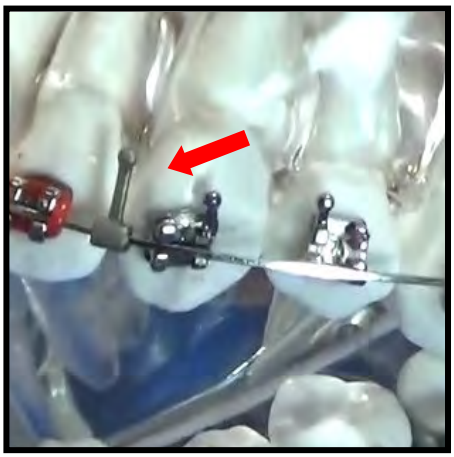


Crimp the hook onto the rectangular wire, close to the laterals.

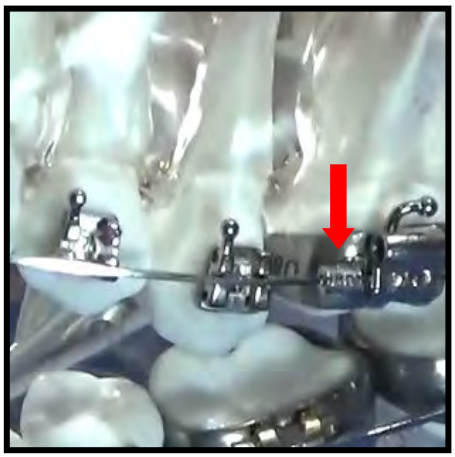


Using the Weingardt, crimp the stop on the wire.

Squeeze the stop on the wire as close to the 1st molar as possible.



Pictured is the hook on the rectangular wire.



Pictured is the stop on the rectangular wire.

Repeat on the opposite side.

On both sides, place a 2-unit power chain around the 1st molars and on the distal tie wings of the 2nd premolars.

Pull the distal cleats out and away from the bands on the lingual side.

Place a 2-unit power chain around the cleat and the button. Retracting both sides of the arch.

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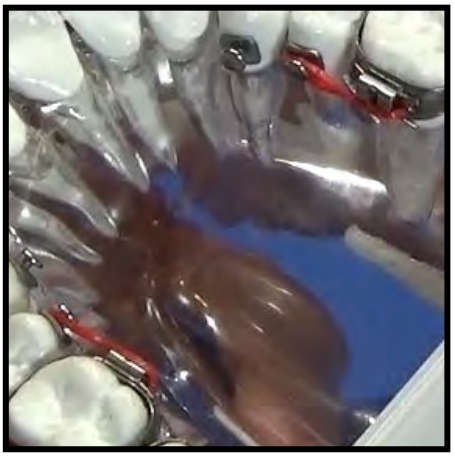


Repeat on the opposite side.

Completed upper arch.

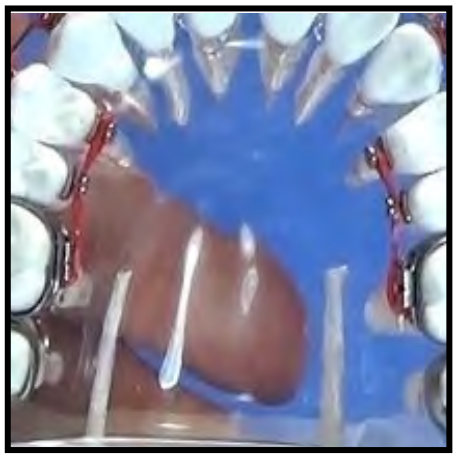
Instruct patient to continue to wear one Class II medium elastics. This time, from the hook just placed, not the canine.

Repeat on opposite side.

At next appointment, remove upper power chains.

Remove lingual power chains.

Once the 2nd premolars are touching the molars, start retracting the 1st premolars, buccally & lingually.



Repeat on opposite side.

Instruct patient to continue to wear Class II medium elastics, wearing the elastics to the hook, not the canines.

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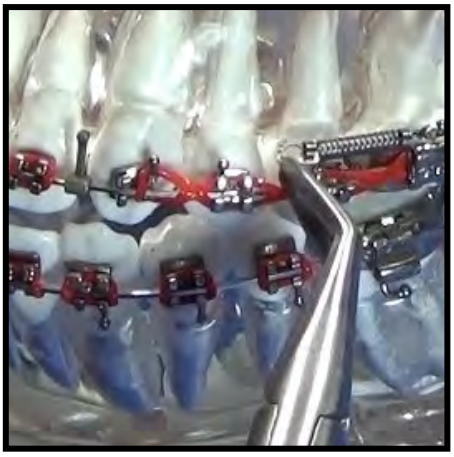

Another option to help retract is a Closed Coil Spring.

Place one hook over the hook on the 1st molar.

Stretch the spring to the hook on the canine.

Place a glide tie over the hook and around the bracket to help hold the spring on the hook.

Again, instruct the patient to continue to wear Class II medium elastics to the hook.

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Exercise 15

Post MDA - SS - .018 x .025 Stainless Steel

Retracting Anterior Teeth

Basic Course

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Post MDA SS - .018 x .025 Stainless Steel

Retracting Anterior Teeth

Purpose:

- To close the space between the centrals, laterals and canines
- Increase labial crown torque
- Proper angulations and torque of teeth
- Continue to hold Class I molars using Class II elastics

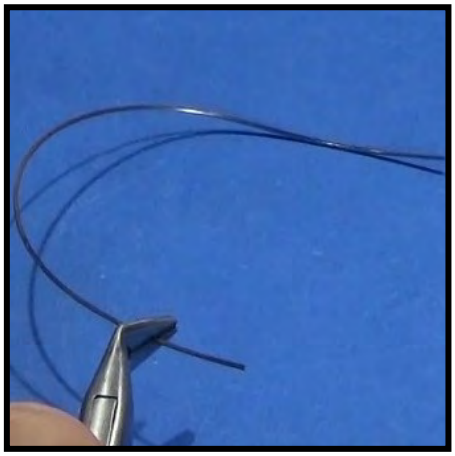
Instruments & Material Needed (Prior to Start of Class):

- Distal End Cutter
- Elastic Remover/Explorer
- Heavy Duty Wire Cutter
- Hollow Chop Plier
- Mathieu Plier– Hook Tip or Wide Tip
- Optical Plier
- Pin and Ligature Cutter
- Ribbon Arch Plier (2)
- Ultimate Hook Crimping Plier
- Weingardt Plier

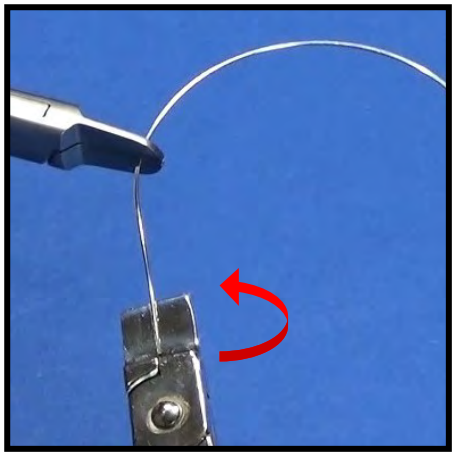
Materials Provided:

- .018 x .025 Stainless Steel Archwire– Upper
- Glide Ties
- Power Chain
- Constant Force Nitanium Closing Springs
- Crimpable Hooks
- 1/4” Medium Elastics

Directions:



Once again, sweep curves into the .018 x .025 stainless steel and make sure they are equal.



Again, use the Ribbon Arch Pliers and twist to detorque the distal ends creating buccal root torque.

Insert the wires, into the molars.

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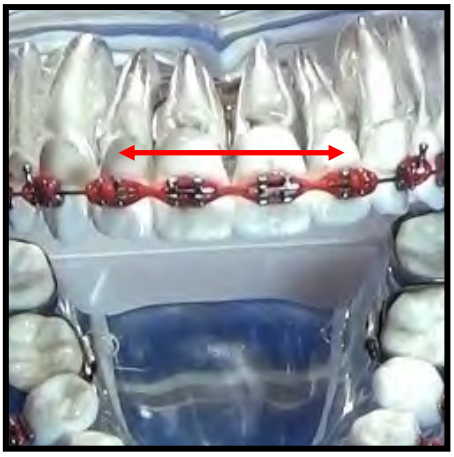
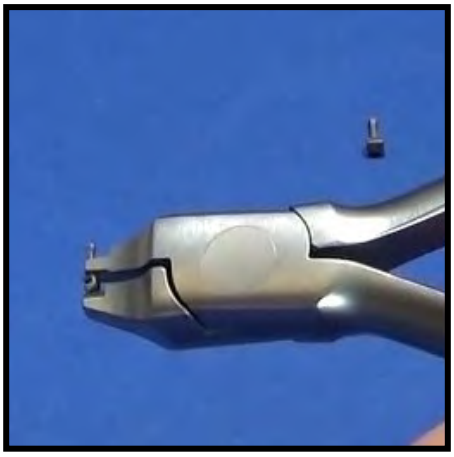
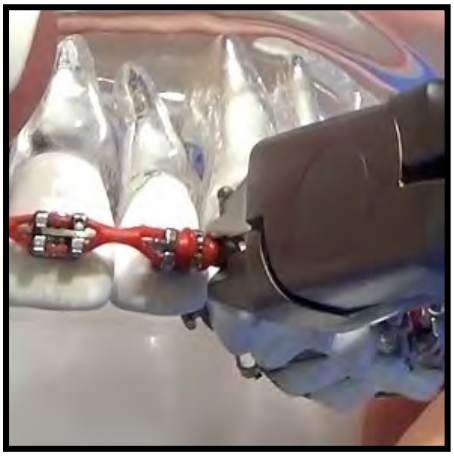
Make sure the curves are going into the vestibule.



Use a power chain to keep the anterior teeth together, only going mesial to mesial.



Using the Ultimate Crimping Plier, crimp the stops on the wire.



Crimp hooks distal to the laterals.

Repeat on the opposite side.

Pictured is the Occulist Plier.

Use the Occulist Plier to bend the hook mesial.

For patient comfort, the hook may be bent towards the tooth as well.

Repeat on opposite side.

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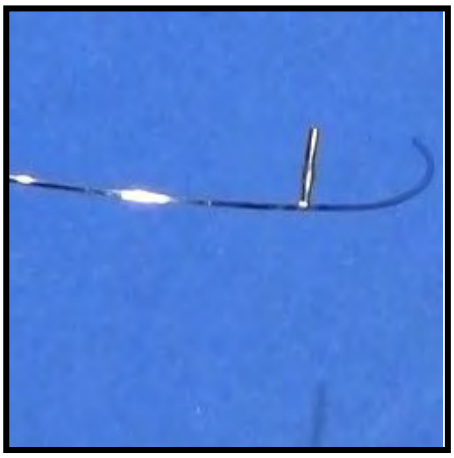
Place the Constant Force Nitanium Closing Springs on the 1st molar hooks.

Stretch the spring to the anterior hooks.

Again, continue the Class II medium elastic wear, 1 per side.



Another option: Use a .018 x .025 Stainless Steel Posted Archwire instead of Crimpable Hooks.

Another option: Use Pletcher Springs instead of Closed Coil Springs.

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Exercise 16

Elastic Strategies

A. Class II
B. Class III
C. Midline
D. Posterior Box, Posterior Triangle, Inter Arch for Scissor Bite
E. Anterior Box

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Elastic Strategies

A through E

Purpose:

- Minor leveling and rotation
- Minor intrusion and extrusion
- Minor labial-lingual movement
- Correct slight Class II & Class III occlusions
- Correct slight midline discrepancies
- Closing Anterior Open Bites

Instruments & Material Needed (Prior to Start of Class):

- Band Pusher/Scaler
- Elastic Remover - Explorer
- Mathieu Plier - Hook Tip or Wide Tip
- Pin & Ligature Cutter
- Ultimate Crimping Plier
- Weingardt Plier

Materials Provided:

- .018 x .025 Stainless Steel Archwires
- Glide Ties
- Crimpable Hooks
- Kobayashi Hooks - K-Ties
- 1/4" Light Elastics
- 1/4" Medium Elastics

NOTE: Single glide ties or power chains can be used during elastics. Light or Medium elastics may be used depending on the patient and/or the amount of movement needed.

Directions:

1. Place the .018 x .025 stainless steel archwires in the typodont.

A. CLASS II

Insert the .018 x .025/SS arch-wires, place elastics from the UPPER canines to the LOWER 1st or 2nd molars.

May use the bag to draw where the elastics are to be worn or have patient take picture with their cell phone.

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B. CLASS III

Class III elastics are worn to pull a Class III bite to a Class I bite

Place elastics from the LOWER canines to the UPPER 1st or 2nd molars.

C. MIDLINE

Elastics are placed diagonally depending on the bite—an U3 to L3.

To enhance the pull, a Class II and Class III can be placed on each side.

The upper arch is pulling to the patient's left, lower arch to the right.

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D. POSTERIOR

Posterior Box elastics can be worn with one box or multiple boxes to close down the premolars.

Triangles can even been worn to help close a bite.

Triangles can become an **Inverted 'V'** for a stronger force to help close a bite.

Interarch elastics can help with premolars in crossbite. Start from the lingual buttons….

...and continue the elastics to the buccal hooks.

This can be done on the 1st molars as well.

E. ANTERIOR BOX

Place K-ties on all the 1s towards the midlines.

Elastics are always worn at the midline to the canines to close an openbite.

Crimpable hooks may be used at the midlines instead of K-ties.

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Exercise 17

.018 x .025 Stainless Steel

Cross Arch Elastics & Sectionals

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.018 x .025 Stainless Steel

Cross Arch Elastics & Sectionals

Purpose:

- To fully intercuspate the posterior teeth
- To fully "sock-in" the posterior teeth as well as the cuspid rise

Instruments & Material Needed (Prior to Start of Class):

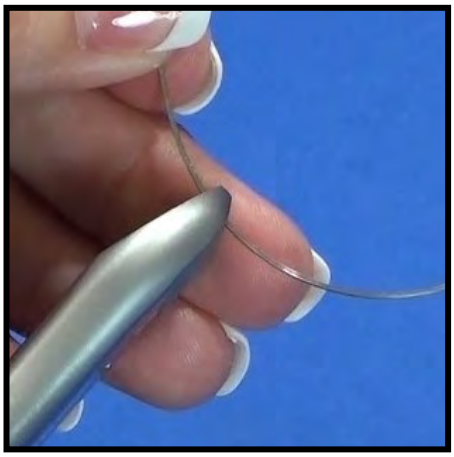
- Arch Markers
- Band Pusher/Scaler
- Distal End Cutter
- Elastic Remover/Explorer
- Heavy Duty Wire Cutter
- Light Wire Plier (Long Bird Beak)
- Mathieu Plier - Hook Tip & Wide Tip
- Pin and Ligature Cutter
- Weingardt Plier

Materials Provided:

- .018 x .025 Stainless Steel Archwires
- Glide Ties
- .010 Prefabricated Ligature Wire
- Power Chain (Short)
- 1/4" Light Elastics

Directions:

Mark distal to all the canines, leaving enough room to make a 90° bend.



Using Heavy Duty Wire Cutter, cut at the marks just made.

Using, the square end of the Light Wire Plier, make a 90° bend TOWARDS the tooth.

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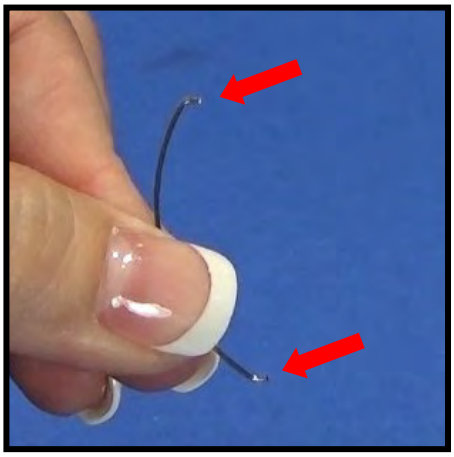

After making both cuts and bends this is what the sectional wires should look like.

Tie the wires in with glide ties or PC. If using PC, place a metal ligature tie around the entire canine brackets.

Take one elastic and hook to the LOWER 6s, around the UPPER 5s and back down to the LOWER 5s - “TP”.

Take another elastic and hook to the UPPER 4s, around the LOWER 4s and back up to the UPPER 3s—”V”.

Do this on both sides - “TP and Vs”. This will “sock-in” the premolars for a better occlusion.

These elastics will make it difficult to open for the patient. They must be worn 24/7, except when eating.

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Exercise 18

Bond-A-Braid

Retention- Lower Lingual

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Bond-A-Braid

Retention- Lower Lingual

Purpose:

- Permanent retention of lower anterior teeth, bonded from cuspid to cuspid, individually to each tooth
- To help maintain results achieved during treatment

Instruments & Material Needed (Prior to Start of Class):

- Band Pusher/Scaler
- Cotton Plier
- Elastic Remover/Explorer
- Hollow Chop Plier
- Pin and Ligature Cutter
- Three Prong Plier
- Weingardt Plier

Materials Provided:

- Bond-A-Braid
- Super Glue
- Floss—5 Strands
- Acceleratory Spray

Directions:

Bond-A-Braid, flat, braided retainer wire.

Measure from canine to canine. Cut longer in case offset bends are needed for cuspid offsets.

Adapt the wire to the lower six anterior teeth.

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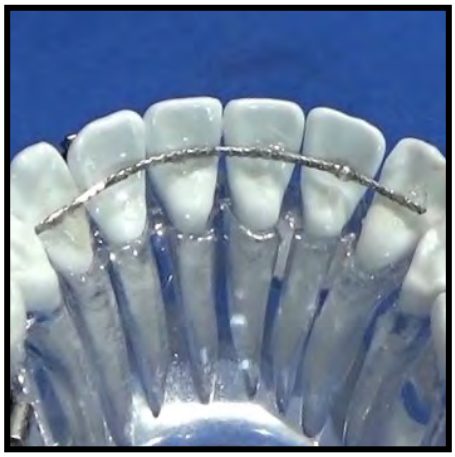
Once the wire is prepared, place five strands of floss between the contacts.

Place the wire using Cotton Pliers, then thread the floss back through the contacts again, holding the wire.

Pull tightly on the floss making the wire flush against the tooth and position accordingly.

Place a dot of super glue on EACH tooth to hold in place.

Once dry, floss your way out and make sure there is no glue between the contact - above and below the wire.



Completed Exercise.

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Diagnostic Forms & Letters

Basic Course

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Orthodontic Evaluation Worksheet

Patient:_____ **Age:**_____ **Sex:**_____ **Date:**_____

Patient's Chief Complaint _____

***Dental/Skeletal Classification**

_____ Class I

_____ Class II ____Div I _____Div II

_____ Class III

_____ Bimaxillary Protrusion

_____ Skeletal Appearance

***Dentition**

_____ Primary

_____ Mixed/Transitional

_____ Adolescent

_____ Adult

_____ Crowding 1 2 3 4 5
mild moderate severe

_____ Spacing

_____ Missing Teeth_____

_____ Anomalies: _____

_____

_____ Active Caries: _____

_____

_____ Overbite/Overjet _____

Airway Evaluation

_____ Deviated Septum

_____ Allergies/Asthma

_____ Venous Pooling

_____ Tonsils: 1 2 3 4

_____ Mouth Breathing

_____ High Palatal Vault

_____ Constricted Nares

_____ Cloudy Sinuses

_____ Snoring

_____ Other:_____

Oral Conditions

_____ Hygiene: 1 2 3 4 5
excellent fair poor

_____ Perio _____

_____ Finger/Thumb Sucking

_____ Thick Frenums mx/mnd

_____ Gingival Recession _____

_____

_____ Tongue Thrust Swallow

_____

Other Conditions (TMD, Limited Opening, Anomalies, etc): _____

_____

***Appliance(s) Needed:** _____

***Other Treatment to Consider– NOT included in Orthodontic Treatment Fee:** _____

_____

Additional Notes: _____

Goals: _____

***Treatment Information**

Months in Treatment _____

Limited Treatment _____ Phase I _____ A____ B____

Comprehensive Treatment _____ Phase II _____ 1__ 2__ 3__ 4__ Ext __

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Orthodontic Treatment Flow Sheet

Start Filling This Form Out At Consultation

Patient:_____ Age:_____ Date:_____

1st Contact– Phone/Office

Appointment # 1: Consultation (complimentary)

____ Consultation with Adult Patient/Minor Patient WITH Parent or Guardian with Doctor & TC
____ Complete Orthodontic Consultation Worksheet (give to doctor for tx planning after workup)
____ General Dental Tx Plan Generated PRN
____ Schedule Work-up (to decide to treat or refer)

Appointment #2: Diagnostic Work-up (Initial Records)

____ Chairside Analysis
____ Study Models
____ Panoramic Radiograph
____ Four Bitewings Radiographs
____ Diagnosis Worksheet (to be completed by doctor)
____Digital Photos (9)
____ Centric Occlusion Blue Bite
____ Cephalometric Radiograph
____ TMJ Screening (Pain or Popping)
____ Collect Records Fee
____ Schedule Case Presentation

Appointment #3: Case Presentation

____ Review Treatment Plan with Adult Patient/Parent or Guardian– treat or refer
____ Sign Contract & Consent Form
____ Schedule Band Spacer Appointment

Appointment # 4: Placement of Band Separators

____ Collect Total Amount of Ortho Fees Remaining
____ Placement of Separators for 1st Molar Bands

Appointment # 5: Band & Bracket

____ Impression for Appliance, if needed Type of Appliance Used: _____
____ Brackets Used (Manufacturer & Prescription):_____
____ 1st Molars Bands Used (Manufacturer & Size):_____ UR____ UL____ LR____ LL___
____ Initial Wire Placed: Size_____
____ Separators placed for 2nd molar bands, if present
____ OHI – Brushing Instructions
    ____ Ortho Care Package – New Patient Kit
    ____ Home Fluoride/Sonicare Dispensed

Appointment #6 Band 2nd Molars, if available

____ 2nd Molar Bands (Manufacturer & Size):_____ UR____ UL____ LR____ LL___

Completed Case: Final Records and Deliver Retainers

____ Chairside Analysis
____ Study Models
____ Panolipse Radiograph
____ Four Bitewings Radiographs
____ Upper Retainer Delivered
____ Fluoride Treatment
____ Digital Photos (9)
____ Centric Occlusion Blue Bite
____ Cephalometric Radiograph
____ TMJ Screening (Pain or Popping)
____ Bonded Lower 3x3 - Lower Retainer Delivered
____ Retainer & Post Care Instructions

Date Treatment Completed: _____

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Williams *Intro* Cephalometric Analysis

Dental Classification (Class I, II, or III)

Molar Difference ____R____L 0 mm (+ = II; - = III)

Cuspid Difference ____R____L 0 mm (+ = II; - = III)

Check One: _____ I ____ II ____III

Cephalometric Analysis

Measurement	Value	Norm	Notes
SNA	_____	82° +/- 4°	_____
SNB	_____	80° +/- 4°	_____
ANB	_____	0 to 4°	_____
WITS mm	_____	–1mm +/- 1mm	_____
SN-GoGn	_____	32° +/- 5°	_____
Y axis (SN)	_____	67° +/- 3°	_____
E-plane MX lip	_____	0 to +2 mm	_____
E-plane MN lip	_____	0 to +2 mm	_____

Skeletal Classification

ANB ____ ° 0 - 4° > = II; < = III

WITS ____ mm -1 +/- 1 mm > = II; < = III

Check One: ____ I ____ II ____III

***Growth Indicators* (Neutral, Clockwise, or Counter Clockwise)**

SN-GoGn ____ ° 32 ° +/- 5 ° > =Clock; < = Counter

Y Axis (SN) ____ ° 67 ° +/- 3 ° > = Clock; < = Counter

***Balanced Face* – Esthetic Profile**

E Plane Mx Lip ___ mm 0 mm +/- 2 mm < = Concave; > = Convex

E Plane Mn Lip ___ mm 0 mm +/- 2 mm < = Concave; > = Convex

SUMMARY:

_____

_____

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Williams *Basic* Cephalometric Analysis

Patient:_____ **Age:**_____ **Date:**_____

Measurement	Value	Norm	Notes
SNA	_____	82° +/- 4°	_____
SNB	_____	80° +/- 4°	_____
ANB	_____	0 to 4°	_____
SN-GoGn	_____	32° +/- 5°	_____
Y axis (SN)	_____	67° +/- 3°	_____
1/1 Angle	_____	131° +/- 4°	_____
U1 to NA°	_____	22° +/- 4°	_____
L1 to NB°	_____	25° +/- 4°	_____
U1 to NA mm	_____	4 +/- 2 mm	_____
L1 to AP line	_____	1 +/- 2 mm	_____
L1 to NB mm	_____	4 +/- 2 mm	_____
Po to NB mm	_____	2 +/- 2 mm	_____
WITS mm	_____	-1 mm +/- 1 mm	_____
E-plane MX lip	_____	0 - +2 mm	_____
E-plane MN lip	_____	0 - +2 mm	_____

Dental Classification (Class I, II, or III) *(determined by model analysis, clinical examination and or photographs)*

Molar Difference ____R ____L	0 mm	+ = II; - = III
Cuspid Difference ____R ____L	0 mm	+ = II; - = III

Skeletal Classification (Class I, II, or III)

ANB ____ °	0 - 4°	> = II; < = III
WITS ____ mm	-1 +/- 1 mm	> = II; < = III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn ____ °	32° +/- 5°	> = Clock; < = Counter
Y Axis (SN) ____ °	67° +/- 3°	> = Clock; < = Counter

Proper Incisor Angulation

1/1 Angle ____ °	131° +/- 4°	> Retrusive; < Protrusive
U1 to NA ____ °	22° +/- 4°	> Protrusive; < Retrusive
L1 to NB ____ °	25° +/- 4°	> Protrusive; < Retrusive

Balanced Face – Esthetic Profile

L1 to AP line ___ mm	1 +/- 2 mm	>= Protrusive; < = Retrusive
U1 to NA ___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
L1 to NB ___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
Po to NB ___ mm	Varies	
E Plane Mx Lip ___ mm	0 mm +/- 2 mm	< = Concave; > = Convex
E Plane Mn Lip ___ mm	0 mm +/- 2 mm	< = Concave; > = Convex

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Williams *Intro* Diagnosis Worksheet

Case #: _____ Patient: _____ Date: _____ DOB: _____

Age: _____yr _____mo Sex: _____ Responsible Party: _____

Address: _____ City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Referred By: _____

Ethnic Norm: _____ Dentition: _____ Treatment Stage: _____

Skeletal Classification

ANB	_____ °	0 to 4°	(> = II; < = III)
WITS	_____ mm	-1 +/-1 mm	(> = II; < = III)

Check One: ____ I ____ II ____III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn	_____ °	32 ° +/- 5 °	(> =Clock; < = Counter)
Y Axis (SN)	_____ °	67 ° +/- 3 °	(> = Clock; < = Counter)

Balanced Face – Esthetic Profile

E Plane Mx Lip	___ mm	1 mm +/- 1 mm	(< = Concave; > = Convex)
E Plane Mn Lip	___ mm	1 mm =/- 1 mm	(< = Concave; > = Convex)

Study Cast, Photos or Clinical Assessment

___Anterior Crowding	___Anterior Open Bite	___Class I	
___Anterior Crossbite	___Anterior Deep Bite	___Class II	
___Posterior Crowding	___Posterior Open Bite		Division 1: ____
___Posterior Crossbite	___Posterior Space Loss		Division 2: ____
___Rotated teeth	___Impacted Teeth	___Class III	
Curve of Spee:____	Smile Line:____		

Sim Analysis:

Arch width (difference between projected & actual)

Mx 3's: _____ Mx 6's: _____

Mn 3's _____ Mn 6's: _____

Arch Length Discrepancies mm: (total of 21-23 difference totals)

Mx Arch: _____ Mn Arch:_____

DIAGNOSIS _____

_____

_____

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Williams Diagnosis Worksheet

Case #: _____ Patient: _____ Date: _____ DOB: _____

Age: _____yr _____mo Sex: _____ Responsible Party: _____

Address: _____ City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____ Referred By: _____

Ethnic Norm: _____ Dentition: _____ Treatment Stage: _____

CEPHALOMETRIC ANALYSIS

Skeletal Classification (Class I, II, or III)

ANB	____ °	0 - 4°	> = II; < = III
WITS	____ mm	-1 +/- 1 mm	> = II; < = III

Growth Indicators (Neutral, Clockwise, or Counter Clockwise)

SN-GoGn	____ °	32° +/- 5°	> = Clock; < = Counter
Y Axis (SN)	____ °	67° +/- 3°	> = Clock; < = Counter

Proper Incisor Angulation

1/1 Angle	____ °	131° +/- 4°	> Retrusive; < Protrusive
U1 to NA	____ °	22° +/- 4°	> Protrusive; < Retrusive
L1 to NB	____ °	25° +/- 4°	> Protrusive; < Retrusive

Balanced Face – Esthetic Profile

L1 to AP line	___ mm	1 +/- 2 mm	>= Protrusive; < = Retrusive
U1 to NA	___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
L1 to NB	___ mm	4 +/- 2 mm	> = Protrusive; < = Retrusive
Po to NB	___ mm	Varies	

Study Cast, Photos or Clinical Assessment

___Anterior Crowding	___Anterior Open Bite	___Class I
___Anterior Crossbite	___Anterior Deep Bite	___Class II
___Posterior Crowding	___Posterior Open Bite	Division 1: ____
___Posterior Crossbite	___Posterior Space Loss	Division 2: ____
___Rotated teeth	___Impacted Teeth	___Class III
Curve of Spee:____	Smile Line: ____	

Sim Analysis:

Arch width (difference between projected & actual)

Mx 3's: _____ Mx 6's: _____

Mn 3's _____ Mn 6's: _____

Arch Length Discrepancies mm: (total of 21-23 difference totals)

Mx Arch: _____ Mn Arch:_____

DIAGNOSIS _____

_____

_____

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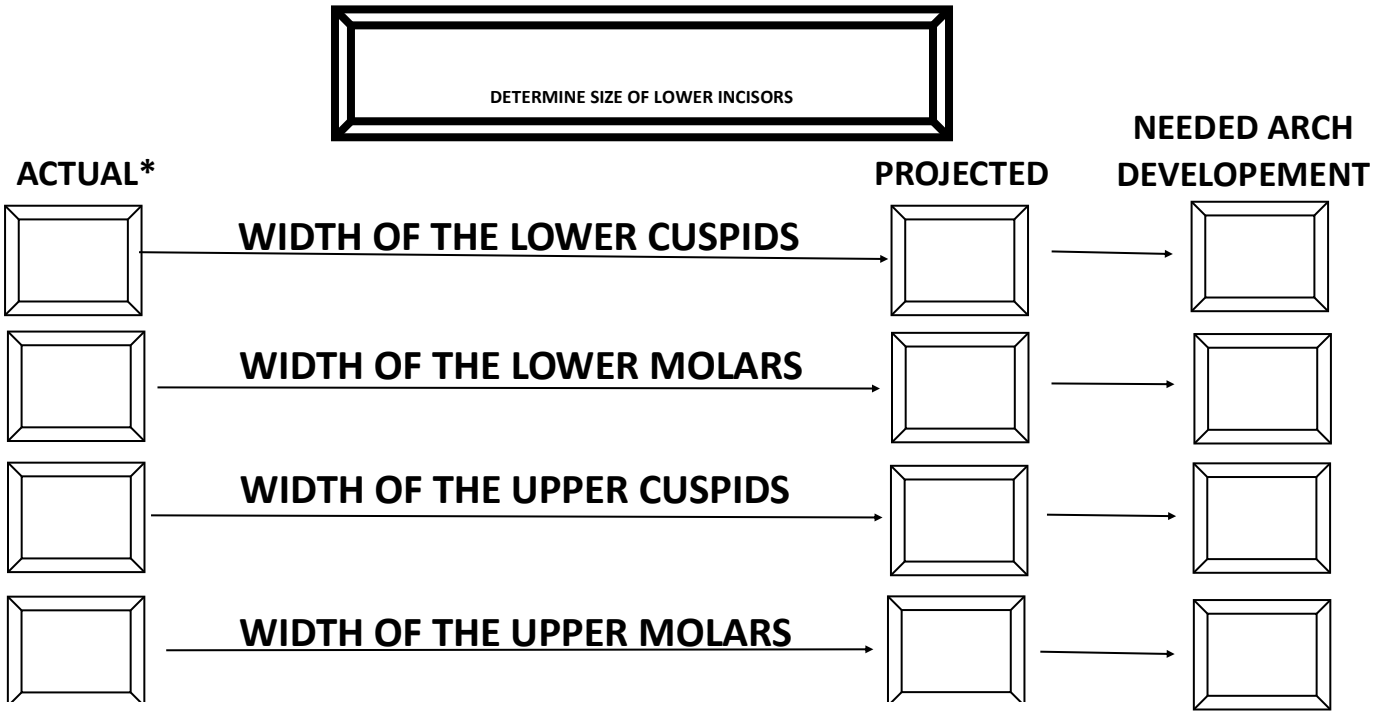
SIM ARCH WIDTH CAST ANALYSIS WORKSHEET



*IF MEASURING PRIMARY CUSPIDS - ADD 4MM TO THE ACTUAL #

*IF MEASURING PRIMARY 2ND MOLARS - ADD 4MM TO THE ACTUAL #

RANGE FOR INCISOR SIZES

SMALL	MEDIUM-SMALL	MEDIUM	MEDIUM-LARGE	LARGE
PROJECTED WIDTH OF THE LOWER CUSPIDS				
30mm	31-32mm	32.5mm	33-34mm	35mm
PROJECTED WIDTH OF THE LOWER MOLARS				
50mm	51mm	52-53mm	54mm	55mm
PROJECTED WIDTH OF THE UPPER CUSPIDS				
38mm	39mm	40-41mm	42mm	43mm
PROJECTED WIDTH OF THE UPPER MOLARS				
54mm	55mm	56-57mm	58mm	59mm

Formula allows for 2mm of post treatment relapse

SAGGITAL "BUCCAL SEGMENT" SPACE PREDICTION "21-23 Rule"

Measure the distance distal of the lateral incisor to the mesial of the 1st molar. 21mm in each of the lower segments and 23mm in the upper segments is required for the 3, 4 & 5. In races with larger teeth, such as Black and Hispanic, use 23-25 Rule.

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Phase I Treatment Plan

Treatment Plan A: Mixed Dentition- Utility Archwires

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
Sagittal/Transverse Appliances, if needed (Determined by the Sim Analysis)	-
.018 NT Prefab UAW (badly malposed teeth)	1-2 months
.016 x .016 NT Prefab UAW (Minor malposed)	1-2 months
.016 x .016 SS Prefab UAW (Tip - backs; Toe - ins; Advance)	6 months
FRLA	Until Phase II (Until premolars erupting)
Total Months in Treatment	**12-14 months**

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Phase I Treatment Plan

Treatment Plan B: Mixed Dentition- Utility Archwires

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
Sagittal/Transverse Appliances, if needed (Determined by the Sim Analysis & Ceph Analysis)	-
.018 NT Prefab UAW (badly malposed teeth)	1-2 months
.016 x .016 NT Prefab UAW (Minor malposed)	1-2 months
.016 x .016 SS Prefab UAW (Tip-backs; Toe-ins; Advance)	6 months
.019 x .025 SS UAW with Twin Force Reposturing or Reverse Face Mask w/ RPE/Hyrax w/ Hooks	6-12 months
FRLA	Until Phase II (Until premolars are erupting)
Total Months in Treatment	**12-18 months**

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Phase II Treatment Plan

SWS Treatment Plan 1: Class I

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
.012 (.014) Nitinol	1 -2 months (Comp. Pads)
.014 Nitinol (RW)	1- 4 months or until rotations are out
018 Nitinol	1 month
020 Stainless Steel (AC/RC CB, if needed) (Step-ins/outs; OCS/stops)	1 – 4 months or until bite open and/or:
.016 x .022 Nitinol (Take Pan and rebracket any teeth if needed)	1month
.016 x .022 Stainless Steel	1month
.018 x .025 Stainless Steel	3 months
Cross arch elastics and sectionals Cross arch elastics and sectionals	2wks – 1 month
Remove posterior bands/brackets –impress for retainers	2wks – 1 month
Remove sectionals – QCM/Bonded lower 3x3	2 wks –1 month
Check in one week, retention forever	-
Total Months in Treatment	**14-18 months**

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Phase II Treatment Plan

SWS Treatment Plan 2: Class II

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
.012 (.014) Nitinol	1 -2 months (Comp. Pads)
.014 Nitinol (RW)	1- 4 months or until rotations are out
.018 Nitinol	1 month
.020 Stainless Steel (AC/RC CB, if needed)	1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
.016 x .022 Nitinol (Take Pan and rebracket any teeth if needed)	1month
.016 x .022 Stainless Steel	1month
MDA/.018 x .025 Stainles	Until over distalized 6-8mm
Retract Premolars on .016 x .022 Stainless Steel (AC-BRT)	2-3 months (Until premolars fully intercuspated)
Retract Canines on .016 x .022 Stainless Steel (AC-BRT)	2-3 months
Retract Anterior Teeth with .018 x .025 posted SS (AC-BRT)	2-3 months
.018 x .025 Stainless Steel	3 months
Cross arch elastics and sectionals	2wks – 1 month (Until premolars fully intercuspated)
Remove posterior bands/brackets –impress for retainers	2wks – 1 month
Remove sectionals – QCM/Bonded lower 3x3	2 wks –1 month
Check in one week, retention forever	-
Total Months in Treatment	**24 months**

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Phase II Treatment Plan

SWS Treatment Plan 3: Class III and some Class I

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
.012 (.014) Nitinol	1 -2 months (Comp. Pads)
.014 Nitinol (RW)	1- 4 months or until rotations are out
.018 Nitinol	1 month
.020 Stainless Steel (AC/RC CB, if needed)	1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
.016 x .022 Nitinol (Take Pan and rebracket any teeth if needed)	1 month
.016 x .022 Stainless Steel	1 month
.018 x .025 Stainless/Lower MDA	Until over distalized 4mm
Retract Premolars on .016 x .022 Stainless Steel (AC-BRT)	2-3 months
Retract Canines on .016 x .022 Stainless Steel (AC-BRT)	2-3 months
Retract Anterior Teeth with .018 x .025 posted SS (AC-BRT)	2-3 months
Upper MDA (if needed)/.018 x .025 Stainless Steel	Until over distalized 4mm
Retract Premolars on .016 x .022 Stainless Steel (AC-BRT)	2-3 months
Retract Canines on .016 x .022 Stainless Steel (AC-BRT)	2-3 months
.018 x .025 SS/posted .018 x .025 SS power chain or spring	2-3 months
Cross arch elastics and sectionals	2wks – 1 month (Until premolars fully intercuspated)
Remove posterior bands/brackets –impress for retainers	2wks – 1 month
Remove sectionals – QCM/Bonded lower 3x3	2wks – 1 month
Check in one week, retention forever	-
Total Months in Treatment	**36 months**

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Phase II Treatment Plan

SWS Treatment Plan 4: Class I, II & III

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
LOWER	
CD Distalizer Initially (EZ distalizer)	2 – 6 months (Until over distalize 6mm)
Remove CD Distalizer, and bracket lower teeth	
.012 (.014) Nitinol	1 -2 months (Comp. Pads)
.014 Nitinol (RW)	1- 4 months or until rotations are out
.018 Nitinol	1 month
.020 Stainless Steel (AC/RC CB, if needed)	1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
.016 x .022 Nitinol (Take Pan and rebracket any teeth if needed)	1 month
.016 x .022 SS	2-3 months
.18 x .25 SS/posted .18 x .25 SS power chain or springs	2 – 3 months

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Phase II Treatment Plan

SWS Treatment Plan 4: Class I, II & III, cont.

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
UPPER	
Bracket/band all upper teeth and follow Williams wire series at same time as placement of lower CD Distalizer	
.014 Nitinol (RW) (Upper)	1-4 months or until rotations are out
.018 Nitinol (U/L)	1 month
.020 Stainless Steel AC/RC CB	1 – 4 months (or until bite open and/or Step-ins/outs; OCS/stops)
.016 x .022 Nitinol (Take Pan and rebracket any teeth if needed)	1 month
.016 x .022 Stainless Steel	1 month
MDA/.018 x .025 Stainless Steel (Upper - If necessary)	2 – 6 months (Until Over distalize 6 mm)
Retract Premolars on .016 x.022 SS (AC-BRT)	1 month
Retract Canines on .016 x .022 SS (AC-BRT)	1 month
.18 x .25 SS/posted .18 x .25 SS power chain or springs) (AC-BRT)	1 month
(If MDA not necessary, .018 x .025 SS)	3 months
Cross arch elastics and sectionals	2 wks – 1 month (Until premolars fully intercuspated)
Remove posterior bands/brackets –impress for retainers	2 wks-1 month
Remove sectionals – QCM/Bonded lower 3x3	2 wks-1 month
Check in one week, retention forever	
Total Months in Treatment	**4 years**

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Extraction Orthodontics

SWS Treatment for Extraction Case:

Patient Name: _____ DOB: _____ Date: _____

Treatment	Treatment Length
Full Standard of Care Records	-
.012 (.014) Nitinol	1 -2 months (Comp. Pads)
.014 Nitinol (RW)	1- 4 months or until rotations are out
.018 Nitinol	1 month
.020 Stainless Steel (AC/RC CB, if needed)	1 – 4 months or until bite open and/or: (Step-ins/outs; OCS/stops)
.016 x .022 Nitinol (Take Pan and rebracket any teeth if needed)	1 month
.016 x .022 Stainless Steel (Power Chain/Closing Springs 6-6) Class II and /or Class III Elastics (as needed) (AC/RC if needed)	Until Space Closed
.018 x .025 Stainless Steel (Power Chain) Class II and /or Class III Elastics (as needed) (AC/RC if needed)	3 months
Cross arch elastics and sectionals	2 wks-1 month (Until premolars fully intercuspated)
Remove posterior bands/brackets –impress for retainers	2 wks-1 month
Remove sectionals – QCM/Bonded lower 3x3	2 wks-1 month
Check in one week, retention forever	-
Total Months in Treatment	**24-30 months**

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Airway Evaluation Letter

Example Letter

Date:

Patient:

Age:

RE: Airway Evaluation

Dear Doctor,

After completing a clinical and cephalometric evaluation of my orthodontic patient, I suspect a problem with the nasal airway. The patient appears to have poor lip seal with a well-established mouth breathing habit. It is my opinion that continued mouth breathing can adversely affect the muscle activity of the face and jaws. As you are aware, muscle function influences facial bone growth, movement of the mandible, and temporomandibular joint function. Normal nasal respiration must be established in order to normalize muscle activity, and eventually, establish normal growth, development, and occlusion.

The patient has been referred to your office for an evaluation of the naso-pharyngeal and oro-pharyngeal airway, as there appears to be evidence of naso-respiratory distress.

Please find enclosed a copy of the patient's cephalogram to assist you with your examination. I have noted where the naso-pharyngeal appears constricted on the cephalogram in the area of the adenoid tissue.

I look forward to receiving your opinion and recommendations regarding the airway concerns and the changes in proper growth and development.

Doctor Name

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Miscellaneous Forms

Basic Course

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Orthodontic Financial Contract

Contract for orthodontic treatment of _____

Date_____

Total Contract $_____

Estimated Insurance Coverage* $_____

**If there is a disruption of insurance coverage because of the termination of the policy or change of insurance companies, we will no longer receive your insurance payments and the remaining balance will be due immediately. If you obtain a new insurance policy, please notify us and we will contact the new company to see if there will be any ortho benefits available for your treatment.*

The records fee is due at the work-up appointment with the remainder of the total contract fee, less estimated insurance, due at the spacers appointment.

The total contract fee for **Comprehensive Orthodontics will** include all records, diagnosis, treatment plan, regular office visits, appliances, 1st retainer and two years of retainer visits. It **will not** include lost retainers/ aligners/appliances, repair of retainers/aligners/appliances, braces or aligner attachments damaged through negligence or any additional dental treatment such as, **but not limited to**, extractions, gingivectomy, frenectomy, composite bonding, IPR, fillings, implants or bridges.

Treatment will be discontinued due to lack of cooperation from the patient after discussion of the problem with the patient and/or parents.

Hygiene: Your treatment is a team effort. As such, your regular hygiene appointments should be maintained with your dentist during orthodontic treatment at 6 month intervals. In some cases, we may suggest routine visits at 3 to 4 month intervals if found necessary.

Retention/Retainers: Retainers are included in the comprehensive orthodontic fees. The retainers are to be worn 24/7 for a minimum of 6 weeks after the braces are removed and then should be worn every night or the teeth will relapse. After completion of treatment, replacement of retainers due to normal wear, loss, breakage or ill-fit due to poor compliance will be re-made at an additional fee. If relapse occurs, retreatment can be done at the full office fee, at that time. **Wear your retainer as long as you want your teeth to be straight.** This is a lifetime commitment.

I understand the financial arrangements and agree to comply with them. I agree that parents (or legal guardians) are the responsible party for all fees and services rendered for treatment of a child. I understand that I am responsible for ALL fees regardless of insurance coverage. I also understand that as treatment progresses additional treatment may be needed. Financial arrangements will be made before any additional treatment.

_____ _____

Patient/ Parent or Guardian Signature Date

_____ _____

Doctor Signature Date

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ORTHODONTIC INFORMATION & CONSENT FORM

We appreciate your confidence in selecting our office for your orthodontic treatment. We want you to be fully informed and feel free to ask questions at any time. Please understand that an important part of your treatment includes making dental arch models, x-rays, and photographs for your records, some of which may be taken several times during the treatment. As a rule, excellent orthodontic results can be achieved with an informed and cooperative patient. To help achieve this end we routinely supply the following information to all of our patients who are considering orthodontic treatment. While recognizing the benefits of a pleasing smile and healthy functional teeth, you should also be aware that orthodontic therapy, like any other health treatment of the body, has some hazards, inconveniences and limitations. These problems are usually overcome and seldom outweigh the long-term benefits, but need to be considered when making a decision to wear orthodontic appliances (braces).

Discomfort:

When appliances are first fitted, and sometimes at the regular visits when the appliances may be adjusted or modified, the patient can expect some discomfort and perhaps even soreness. This discomfort usually disappears after a few days. If it persists longer, please call us, as we may need to examine the patient and perhaps modify the appliance adjustments.

Dental Hygiene:

Decalcification (permanent markings on the teeth), tooth decay, or gum disease can occur during orthodontic therapy if patients do not brush and floss their teeth properly as instructed. Candy and excessively sweet between-meal snacks are to be eliminated. Regular check-ups and cleanings at our office need to be scheduled a minimum of every six months, to check for decay, gum problems, and to clean the teeth. Occasionally, gum disease problems that were present before orthodontic treatment may be worsened by the wearing of braces and may require further dental treatment of a non-orthodontic nature. **We cannot stress enough the importance of regular dental care when in orthodontic treatment**.

Appointments:

Orthodontic appointments are available Monday-Thursday, 8am-4pm. **We can't guarantee availability of after school appointments**.

Retention/Retainers: Retainers are included in the comprehensive orthodontic fees. The retainers are to be worn 24/7 for a minimum of 6 weeks after the braces are removed and then should be worn every night or the teeth will relapse. After completion of treatment, replacement of retainers due to normal wear, loss, breakage or ill-fit due to poor compliance will be re-made at an additional fee. If relapse occurs, retreatment can be done at the full office fee, at that time. **Wear your retainer as long as you want your teeth to be straight.** This is a lifetime commitment.

Nerve Injury:

On rare occasions, while orthodontic treatment in under way, the nerve of a tooth may flare up to become inflamed or diseased. Usually this can be traced to a past injury or even a deep filling in the tooth done previously. If nerve treatment or endodontic procedures become necessary, this is not considered part of the orthodontic treatment.

TADS:

Your treatment may include the use of a temporary anchorage device(s) (I.e. metal screw or plate attached to the bone.) There are specific risks associated with them. It is possible that the screw(s) could become loose which would require its/their removal and possibly relocation or replacement with a larger screw. The screw and related material may be accidentally swallowed. It is possible that the tissue around the device could become inflamed or infected, or the soft tissue could grow over the device, which could require its removal, surgical excision of the tissue and/or the use of antibiotics or antimicrobial rinses. When inserting the device(s), it is possible to damage the root of a tooth, a nerve, or to perforate the maxillary sinus. Usually these problems are not significant: however additional dental or medical treatment my be necessary.

Patient/Parent/Guardian Signaure:_____

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Resorption of Root Tips:

In some instances the tips of the teeth may be seen to shorten slightly during orthodontic treatment. This is called root resorption. However, under most circumstances, these slightly shortened roots pose no disadvantage. There is no way to foresee whether this will occur and nothing can be done to prevent this from happening.

T.M.J. Dysfunction:

There is a chance that some pain or discomfort can occur in the lower jaw joints (TMJ dysfunction). The aligning of the teeth to a more normal occlusion or the level of bite being corrected, usually removes the problem. However, in some rare cases, other non-orthodontic treatment may require a TMJ specialist.

Growth Spurts:

Occasionally, a person who has grown normally up to the age where orthodontic treatment begins may not continue to do so. If these growth changes produce disproportionate problems, in which the jaw position is affected, the original treatment objective may have to be re-evaluated and the course of treatment altered to meet the new circumstances. Such skeletal disharmony is a biological process of body growth, and may be beyond the dentist's control using orthodontic appliances alone.

Patient Cooperation:

Successful orthodontic treatment can be brought about only through the cooperation of all parties involved. Arriving at the office on time for appointments, having the patient take excellent care of his/her teeth during the treatment phases, and wearing all appliances as instructed and excellent cooperation will go far to help the dentist succeed in reaching the orthodontic goals envisioned at the start. If the patient does not wear the appliances, headgear, elastic bands, or tooth positioners or retainers, exactly as instructed by the dentist, then such lack of cooperation will lessen the success of the orthodontic therapy or lengthen the treatment time, or both.

I certify that the *Orthodontic Information and Consent Form* outlining general considerations and potential problems and hazards of orthodontic treatment was presented to me, and I have read and understood its contents. I have had an opportunity to discuss it with Dr. Williams to clarify any areas I did not understand. I authorize Dr. Williams to provide orthodontic treatment for:

_____

Patient

The prescribed treatment was explained to me in detail. I further understand that, like the other healing arts, the practice of orthodontics is not an exact science, therefore, results cannot be guaranteed. ***I understand that Dr. Williams is not an orthodontist, but instead, a general dentist who practices orthodontics.***

_____ _____

Patient/ Parent or Guardian Signature Date

_____ _____

Doctor Signature Date

I give my permission that any records made during the process of examination, treatment, and retention my be used for the purposes of research, education, or publication in professional media. **Initial:**_____

I also give my permission to include these records in advertising and marketing in social media, including but not limited to Williams Dental & Orthodontic, P.C. website and Facebook. **Initial:**_____

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Orthodontic CDT Codes

Ortho

DENTITION:

Primary Dentition: Teeth developed and erupted first in order of time.

Transitional Dentition: The final phase of the transition from primary to adult teeth, in which the deciduous molars and canines are in the process of shedding and the permanent successors are emerging.

Adolescent Dentition: The dentition that is present after the normal loss of primary teeth and prior to cessation of growth that would affect orthodontic treatment.

Adult Dentition: The dentition that is present after the cessation of growth that would affect orthodontic treatment.

All of the following orthodontic treatment codes may be used more than once for the treatment of a particular patient depending on the particular circumstance. A patient may require more than one limited procedure or more than one comprehensive procedure depending on their particular problem.

LIMITED ORTHODONTIC TREATMENT:

D8010 **Limited orthodontic treatment of the primary dentition**

D8020 **Limited orthodontic treatment of the transitional dentition**

D8030 **Limited orthodontic treatment of the adolescent dentition**

D8040 **Limited orthodontic treatment of the adult dentition**

COMPREHENSIVE ORTHODONTIC TREATMENT:

D8070 **Comprehensive orthodontic treatment of the transitional dentition**

D8080 **Comprehensive orthodontic treatment of the adolescent dentition**

D8090 **Comprehensive orthodontic treatment of the adult dentition**

APPLIANCES:

D8210 **Removable appliance therapy**

Removable- patient can remove; appliances for thumb sucking and tongue thrusting.

D8220 **Fixed appliance therapy**

Fixed- patient cannot remove; appliances for thumb sucking and tongue thrusting.

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OTHER ORTHODONTIC SERVICES AND ANCILLARY CODES:

D8660 **Pre-orthodontic treatment examination to monitor growth and development** – Periodic observation of patient dentition, at intervals established by the dentist, to determine when orthodontic treatment should begin. Diagnostic procedures are documented separately.

D8670 **Periodic orthodontic treatment visit**

D8680 **Orthodontic retention** (removal of appliances, construction and placement of retainer (s)

D8681 **Removable orthodontic retainer adjustment**

D8695 **Removal of fixed orthodontic appliances** for reasons other than completion of treatment.

D8696 **Repair of orthodontic appliance-Maxillary**-Does not include bracket and standard fixed orthodontic appliances. It does include functional appliances and palatal expanders.

D8697 **Repair of orthodontic appliance-Mandibular**-Does not include bracket and standard fixed orthodontic appliances. It does include functional appliances and palatal expanders.

D8698 **Re-cement or re-bond fixed retainer– Maxillary**

D8699 **Re-cement or re-bond fixed retainer– Mandibular**

D8701 **Repair of fixed retainers– Maxillary**, includes reattachment

D8702 **Repair of fixed retainers– Mandibular**, includes reattachment

D8703 **Replacement of lost or broken retainer– Maxillary**

D8704 **Replacement of lost or broken retainer– Mandibular**

D8999* **Unspecified orthodontic procedure, by report** – Used for procedure that is not adequately described by a code. Describe procedure.

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Orthodontic Benefits Checklist

Date: _____

Patient Name: _____ DOB: _____

Relationship to Subscriber:

☐ Self ☐ Spouse ☐ Dependent

Subscriber Name:_____ DOB: _____

Subscriber SSN/ID #: _____ Group #: _____

Insurance Company:_____

Mailing Address:_____

Phone #: _____ Eligibility Date: _____

Plan Type:

☐ PPO ☐ Traditional ☐ Capitation ☐ Fee Schedule

Out-of-Network Benefits: ☐ Yes ☐ No

If the Doctor is a member of the orthodontic patient's insurance network, does the plan control the maximum fee that the doctor may charge by contract, even thought there is no orthodontic coverage by the plan?

☐ Yes ☐ No

Who is eligible for orthodontic benefits?

☐ Subscriber ☐ Spouse ☐ Dependents up to age: _____

Maximum benefits: $_____

☐ Annual ☐ Lifetime ☐ Combined Dental/Ortho

Remaining Benefits: $_____ Waiting Period? ☐ Yes, how long _____ ☐ No

Ortho Deductible: $_____

☐ Annual ☐ Lifetime ☐ ` Combined Dental/Ortho

Payment of Orthodontic Benefits

Are benefits paid on an automatic schedule after the initial claim for active treatment? ☐ Yes ☐ No

If yes, what are the payment intervals? ☐ Monthly ☐ Quarterly ☐ Other: _____

What is the required payout period for full reimbursement of the lifetime benefit? _____

Is the placement of post-orthodontic retainer paid separately? ☐ Yes ☐ No

Is it necessary to establish medical necessity for benefits to be paid? ☐ Yes ☐ No

If treatment is provided as a cosmetic service, does the PPO control the fee? ☐ Yes ☐ No

Note: Case fee may be subject to fee capping when participating with a PPO in a state without non-covered benefit legislation and for patients covered by self-funded (ERISA) plans. This is, the payer can dictate the fee charged for orthodontic services, even when no reimbursement is provided. If in a state with non-covered benefit legislation and orthodontic services are not a covered service of the plan, the patient will generally be responsible for the full orthodontic fee with no mandated write-offs if an insured plan.

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Separators

Spacers

- Separators are small circular-shaped rings that are placed BETWEEN YOUR TEETH about 2-3 days before you get your braces.

- At first, it will feel TIGHT like something is stuck in your teeth (because there is). This feeling usually goes away by the time you leave the office and you will feel fine. However, everything in orthodontics is DELAYED. So after a few hours or the next day is when you will notice some tenderness.

- Your teeth may be sensitive for a few days. It is suggested to take an over-the-counter pain reliever prior to your appointment to relieve any discomfort. CHEW THROUGH IT. Please continue to chew and eat, if you baby your teeth, they will be more sore and the soreness will last longer. If needed, warm salt water rinses always help.

- Please DO NOT EAT STICKY or CHEWY FOODS, this includes CHEWING GUM. Doing so may pull your separators out which will cause the spaces to close. The processes will have to start over again.

- CHECK your separators daily, if you should lose any, please call us so we may replace them for you.

- These separators will create a small space between your teeth so that we can fit your bands in an easy and comfortable manner. Bands are similar to a ring placed on your finger, there are many sizes and we will find the best fit for you.

If you have any questions or concerns, please do not hesitate to CALL US. We understand this is a new process and want to make it as easy for you as possible.
Office phone:
After hours ER phone:

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First Day With Your Braces!!!

Congratulations

You have started the first steps towards your healthiest, most beautiful smile. You have also started the biggest adjustment period with braces.

In the first few days, there could be:

- **Mild soreness** or tooth discomfort – this usually starts later that same day or the next day
- **Tissue irritation** from the brackets, wires, appliances, or anything else that has been placed
- Patients will **start adapting** to the soreness or discomfort that comes with moving teeth during this period

To help reduce the soreness – after ALL orthodontic appointments:

- **Chew sugarless gum**
- **Eat, Eat, Eat** !!! – chew your food where it is the most sore
- Take **pain reliever** BEFORE the soreness starts – once it starts to hurt, it's too late
- **Eating immediately after orthodontic appointments** will help, since you are not sore until later that day or the next
- **Do not baby your teeth** - you will be more sore and sore longer than necessary

Before leaving the office after orthodontic appointments:

- **CHECK the ENDS of the WIRE** – using your cheeks, tongue or fingers, make sure nothing is poking or catching on your cheeks or gums
- **HOMEWORK** – Make sure you understand what is expected of you until your next appointment
    - ◊ Wearing Rubber Bands/Elastics
    - ◊ Working on Better Hygiene
    - ◊ Warm Salt Water Rinses
- **SUPPLIES -** make sure you have enough supplies to last until your next ortho appointment
    - ◊ Rubber bands/elastics
    - ◊ Dental wax
    - ◊ Special toothpaste or mouthwashes to improve hygiene
- **MAKE YOUR NEXT APPOINTMENT**
    - ◊ Ensures your appointment are kept every 4-6 – scheduling longer than that could prolong treatment
    - ◊ Our schedules are booked 4-6 weeks in advance so appointments fill up quickly

Emergencies **With Your New Braces**

- There are not a lot of emergencies with braces
- Anything that breaks and comes out of your mouth – SAVE IT – put it in a baggie contact the office for an appointment to address it.
- Broken brackets are NOT an emergency – call and let the office know you have loose brackets
- Anything that prevents you from eating and talking OR is making you bleed – is NOT normal, please contact the office

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Sports or Music **With Your New Braces**

- If you play a musical instrument, there will be a learning curve until you adjust to your new braces. You may need extra wax until then.
- If you play a sport, you will most likely need a mouth guard, you CANNOT use regular mouth guards bought at the store.
- Special mouth guards specifically for braces are what is needed. Please ask the office for more information about these mouth guards.
- If there is a severe sports injury involving your teeth, contact the office immediately

Hygiene **With Your New Braces**

- You Eat……..You Brush – get the food off
- Brush 3x a day
- Brush for a full 2 minutes
- Don't forget to brush your gums – they are just as important
- Floss, using floss threaders to make it easier
- Use mouthwash with fluoride, especially before bed

Eating **With Your New Braces**

- When in doubt break, tear and/or cut food into small pieces and chew on your back teeth
- Avoid biting into hard foods
- Stay away from sticky or hard foods
- It's a learning curve – you will have to eat differently

Habits **With Your New Braces**

- Do not bite your fingernails – great time to break this habit
- Do not chew on straws, pens or pen caps
- Do not open screw-top containers with your teeth, like water bottles

Remember: Any soreness you feel from the braces *is just the crookedness leaving your smile!*

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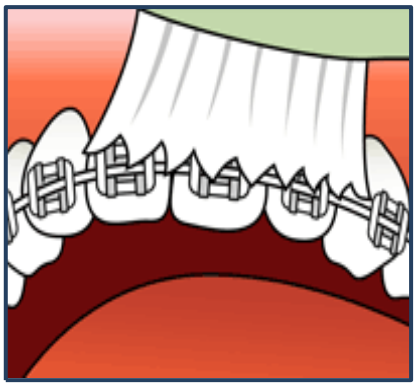
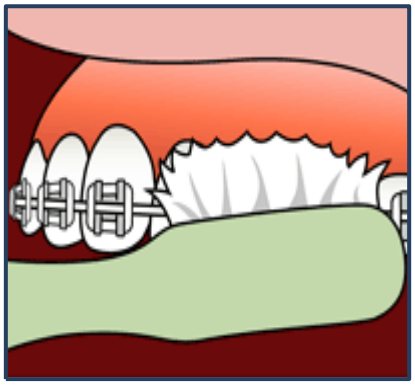
Brushing & Flossing with Braces

Brushing



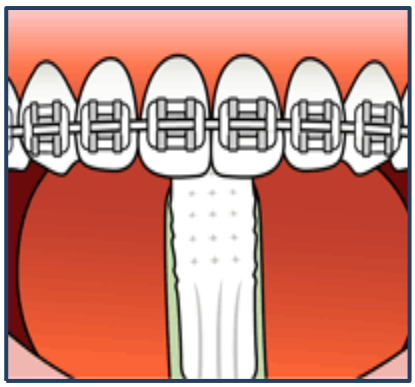
Step 1

Using a dry brush with a small amount of tooth-paste place bristles where gums and teeth meet.



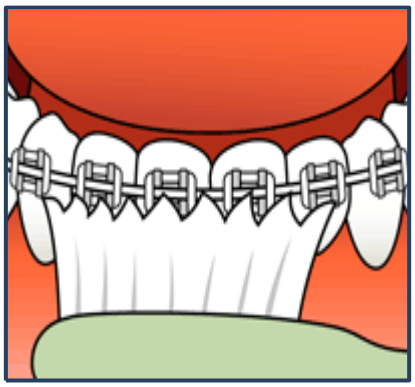
Step 2

For 10 seconds on each tooth use circular, vi-brating motions around the gum lines.



Step 3

Every tooth of both arches should be brushed slowly.



Step 4

Brush the lower teeth from gum line up and the upper teeth from the gum line down. Brush the roof of your mouth and your tongue too!

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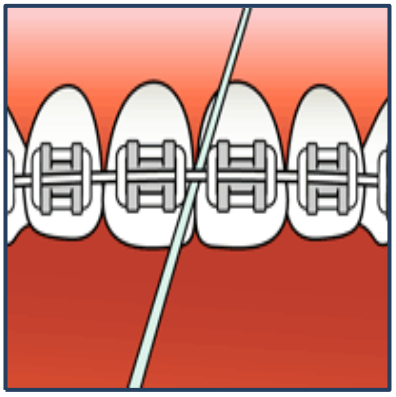
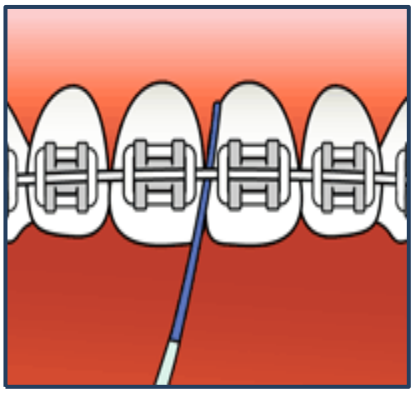
Flossing



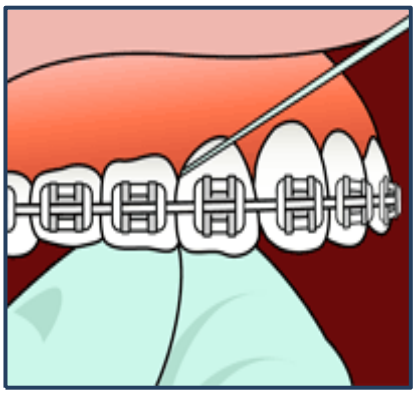
Step 1

Carefully thread unwaxed floss between braces and wire. You may find a floss threader helpful.



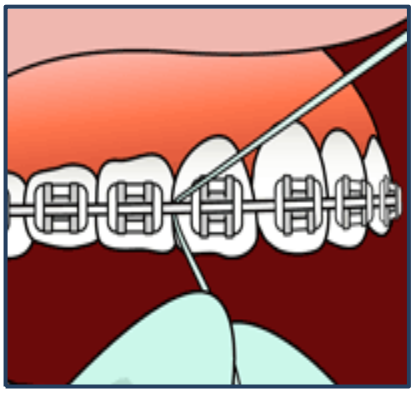
Step 2

Carefully floss around the braces..



Step 3

Carefully floss around the gum areas.



Step 4

Carefully floss each tooth.

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Elastic Wear

Rubber Bands

- Elastics WORK ON YOUR BITE. This means how your upper teeth and lower teeth fit together. The better they fit together the more STABLE your bite will be.

- Teeth could be a LITTLE SENSITIVE at first. The best way to work through the sensitivity is to WEAR THE ELASTICS continually. Continually starting over will lead only to more discomfort.

- Wearing your elastics consistently will KEEP YOUR TREATMENT PROGRESSING consistently. If you DO NOT WEAR them, your treatment will be compromised! It will TAKE LONGER to finish your case.

- Elastics are 100% YOUR RESPONSIBILITY, how long you have to wear them depends on you and you alone.

- **INSTRUCTIONS FOR BEST RESULTS:**
  - ◊ Wear them 24/7 – all day, every day
  - ◊ EXCEPT when you are eating
  - ◊ CHANGE them 3-4 times a day. Put new ones on, the old ones stretch out
  - ◊ If you lose or run out, stop by and pick up more – DO NOT GO WITHOUT
  - ◊ Give yourself EXTRA TIME during the day to put them on until you are comfortable taking them on and off.

- TAKE A PICTURE with a cell phone, if possible. We will INSTRUCT AND SHOW you how to put the elastics on and take them off before you leave the office.

- DO NOT GET FRUSTRATED, you will do this all day, every day. Eventually, putting them on will become second nature.

If you have any questions or concerns, please do not hesitate to CALL US. We understand this is a new process and want to make it as easy for you as possible.

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Retention

Retainer Information & Instructions For Wear

- **IF retainers are not worn as directed, teeth will shift and retreatment may be desired. Retreatment will be done at full office fee.**
- There are several different types of retainers. Some may be removable others will be fixed (glued in). **Removable retainers are 100% YOUR RESPONSIBILITY for wearing them according to the instructions.** These are usually upper retainers but can also be made for the lower. Fixed (permanent) retainers are usually on the lower arch, but can be placed on the upper as well.
- The first few days you may notice EXCESS SALIVA (extra spit) and an ALTERATION OF YOUR SPEECH PATTERN (you may talk funny). This should go away in a few days.

CARING FOR RETAINERS:

- Bring your retainers to all orthodontic and hygiene appointments.
- Brush your retainers when you brush your teeth.
- Do not soak your retainers in mouthwash, the alcohol will dry it out and make it brittle
- Keep your retainers and retainer cases up and away from pets – they like to eat them.
- Always store your retainers in the case we provide you.
- Do not put them in pockets, backpacks, purses, etc. – they will get broken.
- Do not leave them in a hot place or in the sun – they can warp and will no longer fit properly.
- Retainers are specifically made from **RECENT IMPRESSIONS** of your teeth –these are typically destroyed during the making of retainers and are no longer useable.
- **If YOUR RETAINER BREAKS, you lose it, etc.** contact the office **immediately** to schedule an appointment, a new impression will need to be made, so a new retainer can be made. Understanding, this impression is of your teeth in their current position. For this reason, it is important to make an appointment **immediately.**
- **This is considered an emergency!**

INSTRUCTIONS FOR BEST RESULTS:

- Retainers are to be **WORN 24/7** the first **6 WEEKS, at a minimum.**
- **NOT WEARING RETAINERS** may cause your teeth to return to their original position before your braces. This may happen in a few weeks to several years, everyone is different.
- After 6 WEEKS, wear them **ONLY AT NIGHT.**
- **To continue to prevent your teeth from moving - wear them at night FOREVER.**

If you have any questions or concerns, please do not hesitate to CALL US. We understand this is a new process and want to make it as easy for you as possible.

INSTRUCTIONS FOR FIXED PERMANENT RETAINERS:

A fixed permanent retainer is a wire that is attached to the back of your teeth.

- Brushing and flossing around the permanent retainer requires more effort. Your risk of cavities and gum disease can increase if you do not take time to properly clean around your permanent retainer.
- Biting into hard or tough foods, like a whole apple or a tough steak, can bend the wire out of shape.
- Foods high in artificial sugars or similar additives, such as soda, can also wear away at the bonding material, potentially loosening the retainer's bond to the teeth.
- If the wire breaks off it will require repair or replacement. There will be a fee to reattach or replace the permanent retainer. Contact us **immediately** if the wire needs to be reattached. **This is considered an emergency!**

_____ _____

Patient Date

_____

Signature– Patient/Parent/Guardian

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Notice of Poor Cooperation

Completed Treatment vs. Incomplete Treatment

Patient Name _____ Date _____

There is an obligation to make every effort to achieve ideal results for each and every orthodontic patient. However, this responsibility requires that you are informed when **poor and inconsistent cooperation will result in:**

- Extended treatment time
- Poor quality results
- Added treatment expenses
- Early termination of treatment

There is no doubt, the most important factor in achieving good results is **consistent cooperation**. The key word is consistent.

Poor and Inconsistent Cooperation could be (check all that apply):

Broken or last minute cancellations

Number of broken appointments: _____

Comments _____

Broken, loose, or missing bands/brackets – may result in extra fee, per orthodontic contract

Number of bands/brackets: _____

Comments _____

Not wearing rubber bands as directed – stalled or incomplete treatment

Instructions regarding rubber band wear: _____

Comments_____

Not wearing removable appliance as directed – stalled or incomplete treatment

Instructions regarding appliance wear: _____

Comments _____

THIS MUST BE A TEAM APPROACH:

As much as possible, check with your child to be certain that the requested treatment is being adhered to
If you have any questions or concerns as to what your child should be doing, please contact the office.

_____
initial

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IF INCONSISTENT OR POOR COOPERATION CONTINUES:

- If your child will simply not cooperate OR
- You feel it is not realistic for you to closely monitor your child's inconsistent cooperation
- A discussion will need to take place to decide to stop treatment and remove braces
- At this point, we are ____ months behind in progress
- If you decide treatment should continue, please be aware that additional fees of $_____ per month will begin as of _____ (date)

Please contact the office as soon as possible to discuss this important situation.

With consistent effort, I'm confident that we can resolve this issue.

_____
Patient

_____ _____
Patient/ Parent or Guardian Signature Date

_____ _____
Doctor Date

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Request for Early Removal of Braces

Incomplete Treatment– AMA

The orthodontic treatment, that was originally diagnosed, has not been completed as planned. Your request for removal of braces is **against medical advise.** Understand that possible complications may arise with early termination of treatment that may include but are not limited to:

- Relapse of progress already completed
- Shifting of teeth
- Jaw and/or joint problems

There is a choice to have retainers made to maintain the teeth where they are currently OR retainers can be declined. If retainers are made, they must be worn indefinitely in order to maintain the teeth in their present position.

Understanding the above information, I hereby request that braces be removed on the below mentioned patient as soon as convenient.

_____
Patient Name

_____ _____
Patient/Parent or Guardian Signature Date

_____ _____
Doctor Signature Date

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Consent to Remove Braces

Completed Treatment

Orthodontic Treatment has been completed as planned, and understanding that, bands and brackets may be removed at this time. Patient satisfaction is extremely important to us.

Once impressions are made, I understand the importance of follow up appointments to deliver retainers and maintenance appointments. I also understand retainers must be worn indefinitely in order to maintain the teeth in their present position. I understand that I am to wear the retainers 24/7 for a minimum of 6 weeks after braces are removed and nightly thereafter. Forever.

As I am pleased with the outcome of treatment, I am giving permission to proceed with removing all orthodontic appliances and impressing for retainers.

_____

Patient Name

_____ _____

Patient/ Parent or Guardian Signature Date

_____ _____

Doctor Signature Date

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Records Release Authorization

Transferring a Patient's Orthodontic Records

At times a patient may need to relocate in the middle of orthodontic treatment. When this occurs, it is highly advantageous for the transfer to be as prompt and convenient as possible.

One of the most important concerns is the identification of a general dentist or an orthodontist who will accept the patient and successfully complete the treatment.

It is necessary that your records be transferred to assure that the receiving doctor is knowledgeable of your orthodontic conditions, orthodontic treatment goals, current treatment plan and related financial arrangements.

To facilitate the transfer of all your orthodontic records, it is necessary that you obtain permission to do so.

I authorize _____(Current Treating Doctor)_____ to release all orthodontic records of, _____(Patient's Name)_____, for the purpose of continuing orthodontic treatment by another general dentist or orthodontist that will be chosen by the patient/parent or guardian.

_____ _____

Patient/Parent or Guardian Signature Date

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Transfer Information– Orthodontic Treatment

Patient Treatment Information

The following treatment information should be forwarded to the new treating doctor, information should include, but not limited to:

Patient Information

Patient's Name_____ Sex_____ Age_____ DOB_____

New Address_____

Former address_____

Home Telephone_____ Work_____ Cell_____

Email_____

Treatment Information

Type of orthodontic case: Class I_____ Class II – Div 1_____ Class II – Div 2_____ Class III_____

Treatment Record – Patient has been treated or is being treated by the following:

Fixed Functional_____ Banded/Bracketed_____ Other _____

Original estimated length of treatment_____ Estimated months to completion_____

Patient's attitude toward treatment (optional)

_____Excellent, cooperative

_____Fairly good, cooperative after urging

_____Poor, seldom shows compliance

Fees already charges

Diagnostic workup and treatment plan	_____
Starting Fee	_____
Monthly payment schedule	_____
Total fee quoted for treatment	_____
Amount returned to patient/parents	_____

Payment record of family (optional)

_____Excellent, up to date _____Slow, pays eventually _____Poor, usually behind in payments

Special notes about patient: _____

_____

Records being forwarded

_____Cephalogram

_____Panograph

_____Photographs

_____Treatment Plan

_____Study Models

_____Other Information

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A New Approach to Evaluation of Orthodontic Record Casts

by Joseph M. Sim, DDS, MSD, IBO, FAPD, FACD

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A new approach to evaluation of orthodontic record casts

Joseph M. Sim, DDS, MSD, IBO, FAPD, FACD

Introduction

For the past 100 years, the securing of orthodontic casts — also called study casts or plaster models of the patient — and measuring them by various means has been an integral part of the orthodontic diagnostic work-up. It is now understood that professionally-prepared study casts provide the only **three-dimensional record** of the positions of teeth and alveolar ridge paterns of orthodontic patients before, during, and following treatment. It is considered essential to obtain **pre-treatment** plaster casts prior to any treatment being performed for the patient, regardless of the patient's age. When the planned treatment is completed, a **post-treatment** set of record casts must be taken, so that the three-dimensional differences produced by treatment can be evaluated. Because these pre-treatment and post-treatment plaster records are so important in modern orthodontic diagnosis and in understanding the effects of various treatment modalities, the **measurement and evaluation** of such casts assumes a major importance both in diagnosis and in the subsequent treatment of orthodontic patients.

While there are many methods of cast measurements and evaluations outlined in the literature, the "new approach" described in this article has been shared with the members of more than 15 orthodontic study clubs taught by the author nationally and internationally during the past 10 years. It appears to serve the dual purpose of preventing the commonly seen over-expansion of arches — in both transverse and anterior-posterior (sagittal) dimensions — during the preparatory phase of treatment using functional-orthopedic appliances, as well as integrating additional values that lead to better treatment planning. A portion of this new approach to the evaluation of casts has been previously published to the Sim Study Clubs and to the Keller TMJ-Orthodontics Course in St. Louis as the Sim Record Cast Analysis, but only in outline form. This article will describe the process in greater depth, logically and completely, so that it may be used by generalists and specialists alike to increase the accuracy of their diagnosis, and provide more realistic options for the treatment planning of their orthodontic patients.

An attempt is made to compare the **arch width measurment** part of the Sim Record Cast Analysis with both the Pont's Index of Arch Development and the Schwarz Analysis. These two analyses are the most common analyses of arch width measurements used by non-orthodontists. It should be noted that both of these analyses were developed in Europe, utilized there by orthodontists and non-orthodontists, who in general completed the majority of their cases using functional-orthopedic appliances. In many instances, their treatment was completed **totally** without the benefit of fixed banded/bonded appliances.

In contradistinction to these methods, the majority of U.S. non-orthodontists who presently provide orthodontic care for their patients tend to **begin** their treatment with some combination of functional-orthopedic appliances, but they almost always **complete** the treatment of cases with some sort of fixed appliance mechanics. In recent years, the most popular fixed appliance option among non-orthodontists has been straight wire arch therapy.

This is in spite of the rather negative approach to fixed appliances noted in Witzig and Spahl's recent text, "The Clinical Management of Basic Maxillofacial Orthopedic Appliances.[1]"

This book has become one of the most important sources of information for many non-orthodontists, as well as orthodontists who were not trained in functional-orthopedic therapy. In fairness to the authors, however, it must be mentioned that their concerns dealt chiefly with fixed treatment of four-bicuspid extraction cases. They cautioned against vertical over-closure leading to TMJ problems in those patients who had received bicuspid extraction therapy.

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Sim Record Cast Analysis:

The three major parts of the Sim Record Cast Analysis are **arch width assessment, arch space discrepancies,** and **buccal segment space prediction.** In the following section, each of these parts of the analysis will be reviewed in general, then later in greater detail.

1. **Measurement of actual widths of arches (transverse dimensions):** These measurments are taken across canines and molars, followed by conversion of the **actual width** to the **projected width** of the lower canines only. The **projected width** of the lower canines is simply an **as if** measurement . . . **as if** the lower canines had been expanded slightly and the lower anterior crowding had been relieved, with the result that a good arcial relation of anterior teeth had been achieved. The **as if** lower canine width measurement (projected width) is based solely on the comparative widths of the lower incisors.

This is similar to what Moyers found when he attempted to provide an assessment of the **sagittal length** of unerupted permanent teeth in the buccal segments. He noted that arcial relations of teeth are **directly related** to the **sum of the widths** of the individual permanent **lower** incisors. The Moyers Chart that resulted from his efforts has been used extensively throughout orthodontics since the 1960's.[2,3,4]

However, Moyers' chart provides only the assessment of **quadrant A-P (sagittal) measurements.** The new approach to orthodontic cast evaluation discussed here provides not only quadrant and arch length discrepancy assessments, but also the evaluation of **transverse arch widths from canine to canine, and from first molar to first molar.** Each of these three types of measurements is critical to a good cast analysis.

2. **Measurements of arch length discrepancy in both arches:** These measurements are usually taken to determine the actual **increase in arch length** that is needed during the treatment to allow the uncrowding of the arches. The measurements are taken **as if** the most stable upper and lower central incisors represent the correct labial-lingual alignment of the arc of the anterior teeth, **and will not be moved either labially or lingually during the treatment.**

With a sharp pencil (.5mm. lead in a mechanical pencil is ideal), the amount of **overlap** of each crowded tooth is scribed on the lingual surfaces of the teeth on the plaster cast, then measured or closely estimated in millimeters. If **crowding** is present, the millimeter assessment is marked as **minus.** Less often, **spacing** is present, in which case a **plus** assessment is entered.

3. **The Buccal Segment Space Prediction:** This is a measurement of the **buccal segment** that may, in a younger patient, contain the primary canine and first and second primary molars, or in an older patient the permanent canine and first and second bicuspids (or in mixed dentition a combination of primary and permanent teeth). The Buccal Segment Space Prediction utilizes the "21-23 Rule" for children with small to medium sized teeth, or the "23-25 Rule" for children with larger teeth. The "21-23 Rule" was originally proposed by the author in the second edition of "Minor Tooth Movement in Children."[5] The "23-25 Rule" is a more recent addition by the author, developed due to the recognized need within his study clubs to provide a quick diagnosis for patients whose tooth size is at the larger end of the scale.

Basically, the "21-23 Rule" states that **21mm.** of arch space is required in a child with normal sized teeth to allow uncrowded eruption of the Mn canine and the two lower bicuspids, while **23mm.** of arch space is required to allow eruption of the Mx permanent canine and the two upper bicuspids.

In children with significantly larger teeth, 2mm. is added to each of the estimates of upper and lower segments, the result of which is the "23-25 Rule".

From age 7 years and beyond (following eruption of the lower permanent incisors), this Rule allows the dentist to predict whether there will be crowding in the **buccal segments of the lower arch.** From age 8½ years and beyond, following eruption of the upper incisors, it will allow the same prediction concerning the **upper arch.**

In a sense, the "21-23 Rule" is a simplification of the material in the Moyers Prediction Analysis Chart, although it was developed from a different concept.

Cross-arch width values:

Methods of measurements: The lower and upper casts are measured in four places to provide a very accurate assessment of **actual widths across the canines and molars, as well as projected widths that proper development of the arches during treatment will provide.**

1. **Lower canines:** The first measurement is taken with the sharpened tips of a Boley gauge or similar instrument, across the lower canines, with the gauge tips held against **disto-facial** surfaces of the teeth at the **gingival** margin.

The **actual width** is entered first, then **projected width** of the **uncrowded** canines is entered next. (Please see Table 1 for chart of lower incisor sizes).

2. **Upper canines:** The second measurement is taken with the Boley gauge across the maxillary canines, with tips of the gauge held at the **disto-facial surface** of each canine at the **gingival margin.**

Note: *If permanent canines are unerupted, then primary canines can be used for this measurement, but 4 mm. must be added to the total dimension measured to simulate the width of the permanent canines.*

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3. **Lower molars (E's or 6's):** The third measurement is taken across the mandibular molars (usually the 6's if the patient is older than 7 years). This measurement is made where the **buccal groove** meets the **gingival margin.**

4. **Upper molars:** The fourth measurement is taken with the gauge measuring the **widest** point on **facial surfaces** of the maxillary first molars (not at the buccal groove, as with lower molars).

Note: *If the primary second molars (E's) are used to establish the width of the arch, 4mm. is added to the total dimension measured (to simulate width of the permanent molars).*

Please see Figures 1-A, 1-B, 1-C, and 1-D, which demonstrate clearly the method of accomplishing cross-arch measurements of canines and molars.

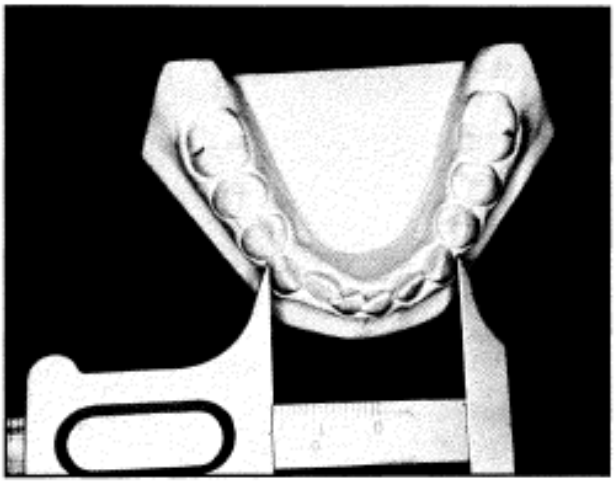

Figure 1-A: Measuring arch width across lower canines with specially prepared Boley gauge.

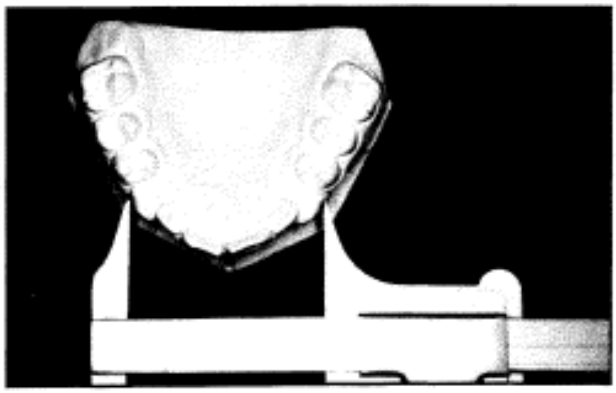

Figure 1-B: Measuring arch width across upper canines.

The formula for arch widths, **keyed on the projected uncrowded width across the lower canines,** can be summed up as follows:

Summary of Sim formula:

Measure **actual width** across lower canines, consult chart of sizes of lower incisors, and estimate **projected width** across lower canines. Once the projected width of lower canines has been assessed, the practitioner will immediately be able to deduce the projected widths of canines and molars in both arches (that is, the arch widths that should be present at the completion of treatment of the patient). With this knowledge, the door opens to the planning of treatment to resolve the patient's problems.

In effect, this Formula states: If you can measure the **actual width** of lower canines and **project the uncrowded width** of lower canines, the widths across the arches of molars and canines of the patient's completed case can be determined by the following formula:

Actual width of canines is **projected** to **final width** by checking the sizes of the lower incisors. Once the projected width of the lower canines is entered, 8mm. is added to achieve the end-of-treatment width of upper canines; 20mm. is added for projected width of lower molars; 24mm. is added for projected width of upper molars.

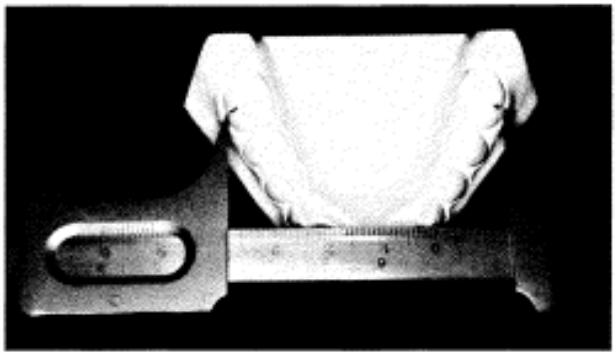

Figure 1-C: Measuring arch width across lower molars.

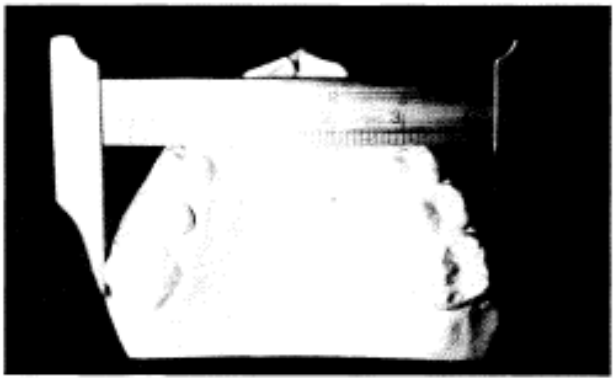

Figure 1-D: Measuring arch width across upper molars.

Summary of arch width equation:

X = projected lower canine width (gained from assessing actual width of lower canines before treatment, and then checking chart of incisor widths to obtain projected width).

X + 8 = projected upper canine width in finished case.

X + 20 = projected lower first molar width in finished case.

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X + 24 = projected upper first molar width in finished cases.

Since the dentist is able to measure the actual widths of lower and upper canines, and the actual widths of lower and upper molars, as well as the projected widths of these same teeth, it is easily seen that this Formula charts a clear pathway of the arch development that must be accomplished during the initial functional-orthopedic phase of treatment to develop the patient's arch widths to ideal (projected width) relations. Usually this is accomplished before the fixed phase of treatment is started.

Range of cross-arch values:

The arch width analysis is based on the finding that the sizes of arches depend basically on the relative widths of the lower incisor teeth. Moyers found this in the early 1960's and published his chart, but his approach was limited to describing the projected **sagittal** measurements of quadrants containing the canines and two bicuspids. He found that if the incisors are **small**, the A-P arch sagittal length of the buccal segment will be **low** on the range. If the incisors are large, the measurements of the expected sum of the widths of teeth 3-4-5 in the upper and lower quadrants will be high on the range.[2] **However, Moyers apparently failed to make the obvious connection that the transverse width of the arch across the canines and molars is also directly controlled by the size of the lower incisors!**

TABLE 1: Estimated sizes of lower incisors as they relate to arch

Widths:

In the Sim evaluation, the sizes of lower incisors, by visual examination or by measurement, produce a range of projected arch width of lower canines that range from 30mm. - 35mm.

Small incisors: Canine width is projected at ..... 30mm.
Medium-small incisors: Canine width is projected at 31-32mm.
Medium incisors: Canine width is projected at ..... 32.5mm.
Medium-large incisors: Canine width is projected at 33-34mm.
Large incisors: Canine width is projected at ..... 35mm.

Comparing arch-width assessments using Sim, Pont's, and Schwarz analyses:

It is difficult to assess — on a measurement-for-measurement basis — the values acquired to complete each of these analyses. For instance, both Pont's and Schwarz analyses measure widths across the first bicuspids instead of the canines as in the Sim analysis. In addition, in these two European analyses bicuspid and molar widths across the arch are measured from the center of the central or distal pit of each tooth, making for a slightly less precise value than when measured against the outside surface of the enamel as in the Sim analysis.

Despite these problems, however, it is deemed instructive to compare measurements gained by all three analyses performed on one patient's casts. For the Pont's and Schwarz analyses, canine widths may be estimated from the widths of the first bicuspids.

TABLE 2: Ranges of cross-arch measurements of canines and molars:

It follows that the ranges of the four norm cross-arch measurements of canines and molars, from small to large, may be assessed as follows: (95% of cases measured).

Lower canines (projected ranges of width after theoretical uncrowding and aligning of anterior teeth) ..... 30 - 35mm.
Lower molars ..... 50 - 55mm.
Upper canines ..... 38 - 43mm.
Upper molars ..... 54 - 59mm.

Note: This formula allows for a 2mm. of post-treatment replapse of width in maxillary arch.

Measuring arch space discrepancies:

Methods used in Sim Record Cast Analysis:

1. **Lower anterior segment:** The lower plaster cast is held in the hands, and a mechanical pencil with .5mm lead is used to mark crowding directly against the plsater of the lingual surfaces of lower centrals and laterals. The over-lapped teeth are marked at their proximal edges so the amount of incisor crowding can be added up quickly by eye.

2. **The buccal segment:** The lower model is turned to the side and over-lap of each crowded canine and bicuspid is marked on the lingual surfaces of the teeth with the .5mm. pencil. The total arch length discrepancy (deficiency) is added together. Please see Figure 2: Shows marking of teeth in lower arch of model.

In patients where there is less than the required amount of space, values are entered as **minus.** In those cases where there is more than the required amount of space in the arches, values are entered as **plus.**

Please see Fig. 2. Illustrates marking with pencil the over-lapping of crowding lower anterior teeth.

Buccal segment (sagittal) space prediction:

The Moyers' mixed dentition prediction analysis to estimate the amount of space needed for eruption of the canine and both bicuspids has been

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TABLE 3: Description of the Schwarz analysis

The following description of the Schwarz Analysis is used with permission of Ohlendorf Orthodontic Laboratory, St. Louis, MO.

To obtain the actual arch width measurements you should:

1. Measure the widths of the maxillary central and lateral incisors. This will be called the sum of the incisors (S.I.)
2. Measure the distance across the arch from the distal pits of the maxillary first bicuspids.
3. Measure the distance across the arch from the distal-labial surface of the mandibular first bicuspid.
4. Measure the distance across the arch from the central pit of the maxillary 6-year molars.
5. Measure the distance across the Mandibular arch from the distal groove of the 6-year molars.

To obtain the **should be** (ideal or after treatment) measurements:

Maxillary arch: Add 8 mm. to the sum of upper incisor widths to obtain the should be widths of upper first bicuspids, and add 16 mm. to the sum of upper incisor widths to obtain should be widths of the upper molars.

Mandibular arch: Add 8 mm. to the sum of lower incisor widths to obtain the should be widths of lower first bicuspids, and add 16 mm. to the sum of the lower incisors to obtain should be, or projected widths of lower 6-year molars.

Comparison of the actual widths across bicuspids and molars with that of the should be (projected) widths will provide the practitioner with the direction of treatment for arch development.

NOTE: The Pont's Index is slightly more complex to use to compute arch widths, but is based on measurements similar to the Schwarz Analysis, emphasizing the sum of the widths of maxillary incisors as the predetermining constant. The inherent problem here is variable widths of the maxillary lateral incisors in many patients.

Figure 2-A: Illustrates marking with pencil the over-lap of crowded lower anterior teeth.

TABLE 4: Assessing arch widths of one patient by three different methods: millimeters of correction needed

Patient: Kathleen M., age 12-5.

Sim Record Cast Analysis: All measurements in millimeters.

Actual widths	Projected widths	Correction Needed
Mn canines: 29.9	Mn canines: 331.5	- 1.6
Mx canines: 36.6	Mx canines: 39.5	- 3.2
Mn Molars: 51.6	Mn molars: 51.5	+ .1
Mx molars: 56.1	Mx molars: 55.5	- .5

Schwarz Analysis: All measurements in millimeters. (8)

	Should Be	Actual	Correction Needed
Mx 1st bicuspid width +8:	37.5	33	-4.5
Mn 1st bicupid width +8:	37.5	32	-5.5
Mx 1st molar width +16:	46.0	45.5	-0.5
Mn 1st molar width +16:	45.5	47	+1.5

Pont's Index: All measurements in millimeters.[6]

	Should Be	Actual	Correction Needed
Mx 1st bicuspid width:	38.0	33	-5.0
Mn 1st bicupid width:	37.0	32	-5.0
Mx 1st molar width:	45.5	46	+0.5
Mn 1st molar width:	46.0	47	+1.0

NOTE: From the comparison of the Sim analysis with both the Schwarz and Pont's analyses, it would appear that the European analyses tend to recommend nearly twice the amount of expansion to achieve the "ideal" arch widths of this patient.

Figure 2-B: Shows the cut off handle of specially prepared Boley gauge that measures directly the incisor over-jet.

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popular for over 25 years. However, it requires that total measured widths of the lower incisors be summed up, and then the Moyers Chart must be used to establish required sagittal space for upper and lower quadrants to permit eruption of the canine and two bicuspids.

The Sim Analysis "21-23 Rule" — which allows rapid buccal segment space prediction — requires no chart and simply consists of measuring space in the child's mouth or on the cast to determine if existing space occupied by the primary canine, and 1st and 2nd primary molars is at least **21mm.** in the lower arch, and **23mm.** in the upper arch.[5]

Please see Figures 3-A, 3-B, 3-C, and 3-D: Shows method of measuring arch space in the buccal segments:

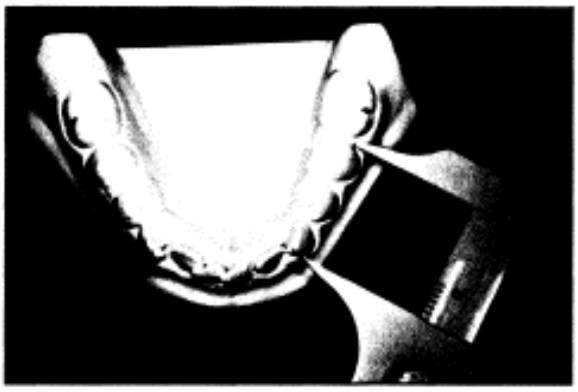

Figure 3-A: Measuring the space in the left lower buccal segment with Boley gauge.

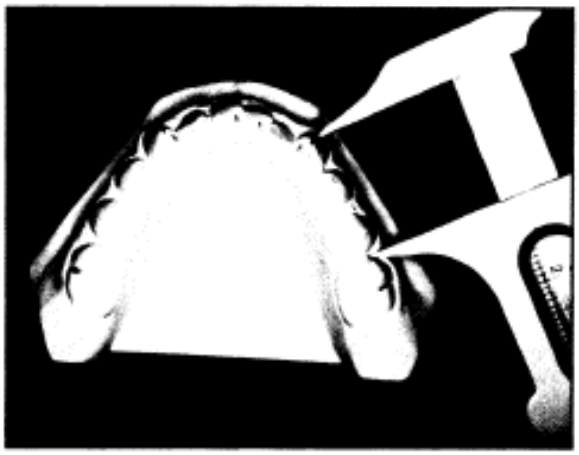

Figure 3-B: Measuring space in lower right buccal segment.

Patients with large teeth:

A few North American Causasian children and a moderate number of American Black, Hispanic and Oriental children will have larger than normal teeth. **When these children are being diagnosed, the 21-23 Rule can be altered to the 23-25 Rule.**

The advantage of this system is that it provides the practitioner with instant diagnostic information without resorting to charts that may not be at hand

Figure 3-C: Measuring space in upper left buccal segment.

Figure 3-D: Measuring space in upper right buccal segment.

while the diagnosis is being performed, either at the chair intra-orally or later with orthodontic casts in hand.

Measuring over-jet and over-bite:

The measurement of over-bite and over-jet may be done either directly in the mouth during Preliminary Orthodontic Evaluation (POE) done at the chair, or it may be accomplished when other measurements of the record casts are being taken. As a check on the accuracy of positioning the lower jaw during the taking of headfilm, incisor relations on the tracing can be measured and compared to direct in-the-mouth measurements to provide a third review of these dimensions.

There is considerable discussion as to what should be viewed as norm over-bite and over-jet. In the Sim 20-Value Computerized Analysis, 2mm. is taken as the norm for each of these measurements (Causasian norm). However, some respected orthodontic authors feel that norms should each be 3mm. For some Black and Hispanic children, and a large percentage of Oriental children, the anatomic factor of commonly noted spade-shapes

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on lingual surfaces of the incisors may act to produce a larger over-jet of as much 5mm., which in turn influences the over-bite.[7]

In Chinese children, the apparent exaggerated over-jet and protrusiveness of upper central incisors may be due also to the combined factors of a smaller than norm chin and a more vertical pattern of facial growth.[8]

Although several methods have been described for assessing over-jet, a simple system is described here. To take measurement of over-jet in the patient's mouth, the Boley gauge should be cut off at **zero** at the end of the handle. With the patient's teeth closed in posterior occlusion, this allows the practitioner to insert the Boley gauge handle immediately below the incisal edges of upper incisors and read the amount of over-jet directly on the gauge. This measures distance between the facial tips of lower incisors to the facial tips of upper incisors.

The measurement of over-bite is best done by scribing the vertical incisor overlap on facial surfaces of the lower incisors with a sharp pencil, then using a Boley gauge to determine vertical measurement on the facial surface of the lower incisor.

Please see Figure 2B: Shows cut off handle of Boley gauge used to measure incisor over-jet directly on casts.

Measuring total arch length:

If the teeth in arches of the patient are harmonious in their relative widths, there is less need to measure painstakingly the width of each tooth in the arch, add up millimeters, and then compare total arch length in both arches to each other. Only when it is obvious that there are microdont lateral incisors, missing teeth, or other problems should this be done routinely.

When there is need to perform this task, comparison of the two arches is usually taken from the mesial contact of the 6-year molars around the interproximal contacts of the teeth in the arch to the mesial surface of the opposite 6-year molar using a soft archwire. The upper total arch length is usually considered to be 12mm. greater than the total arch length of the lower arch.

While there are several methods for actually measuring the teeth in arches, the Bolton Tooth Size Analysis is used most often.[4]

Measuring the height of the palatal vault:

Measuring palatal vault height is one of the only methods available to the practitioner to assess the **vertical** pattern of growth of the upper arch. The greater the palatal vault height is, the more vertical development is seen in the maxillary complex of bones.

In addition, the greater the height of the palatal vault, generally the more easily treated is the patient being diagnosed. Or, stated in another fashion, the greater the height of the palatal vault, the larger the percentage of cancellous bone in the alveolar ridges. With the higher percentage of cancellous bone, remodeling of the bone within the ridges during movement of teeth proceeds with much greater ease and comfort for the patient.

In the past, it has not always been explained clearly that palatal vaults of diminished height represented patients with a high percentage of cortical bone, with the result being more difficult-to-treat cases. Additionally, it has been seen that the higher the palatal vault, the more anchorage is available for such appliances as Schwarz type transverse expansion appliances, and distal drive sagittal appliances.

Height of the palatal vault is measured with a Boley gauge, midway on the palate between the fully erupted upper first bicuspids. It has been established that 14mm. is the **norm height** of the palatal vault in a 12-15 year old patient.

The gauge is inserted into the plaster cast vault, and the cast is viewed from the side. The level across the occlusal surfaces of the 1st bicuspids is sighted, and palatal depth on the Boley gauge is marked at this point.

The height of the adult palatal vault typically increases 1 to 4mm. during maturity.

Assessing the widths of unerupted Mx lateral incisors:

If central incisors have already erupted in the upper arch, and all lower incisors have erupted, it is sometimes necessary to assess the width of the **unerupted** maxillary lateral incisors to determine a potential arch length discrepancy.

To do this, measure widths of each of the maxillary central incisors, average their width, and multiply by 75%. This will provide the usual width of the unerupted lateral incisor.[9] Another method, less accurate, is to measure width of the central incisor and subtract 2mm. to determine width of the unerupted lateral incisor.

Diastemas between Mx central incisors . . . when to plan surgery:

There have been many discussions among dentists concerning if or when a diastema between the maxillary central incisors should be treated with appliance therapy to close it. A rather conservative estimate determining the need to close diastemas orthodontically was published in the late 1960's. It still seems to present the best diagnostic approach.

This study, conducted at the University of Oregon, indicated that the diastema should be measured **when the maxillary centrals and laterals are fully erupted.** It was found that a diastema of less than 3mm., measured at approximately 9 years of age, would have a good chance to close natural-

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ly with eruption of the maxillary canines. If the diastema is greater than 3mm., a means of orthodontically closing the space should be considered. If the space exceeds 3mm., and the frenum is quite heavy and connected to the incisal papilla so blanching occurs when upward tension of the whole lip was applied, frenectomy might be indicated.[10]

Additional factors in cast diagnosis:

There are a number of additional factors to consider during an orthodontic diagnosis and establishment of a treatment plan:

Factor 1: Transferring patient's midlines to casts: The most accurate method of establishing a patient's midline in relation to incisor positions is to hold a fine piece of dental floss against the patient's forehead, nose and chin. With the dental floss held in place to establish the sagittal midline, the patient is told to separate the lips and open and close slowly into centric occlusion.

The upper dental midline can be noted with the teeth closed in occlusion, but the lower dental midline should be noted with the mouth open 15-20mm. This avoids the problem of mandibular shift that occurs in cases of premature cuspal contacts and unilaterally expressed posterior cross-bite.

When the position of the upper dental midline is noted on the chart, it can then be transferred to the orthodontic record casts. The use of soft tissue labial frenums to establish the sagittal midline relation is quite inaccurate in many patients.

Factor 2: Palatal expansion limitations: Palatal expansion is **not** a good method of uncrowding Mx canines. If a rigid, fixed RPE appliance is used to expand the maxillary arch, adjusted twice each day, up to 8mm. may be gained in arch width. For each 8mm. gain in arch width, there may be only 4-6mm. gained in total arch length.

Factor 3: Expansion of lower canines: This may be done using any sort of jackscrew or lingual arch appliance; however, it is best accomplished during the ages of 7 and 10 years. Earlier than this, lower incisors may be interrupted in their eruption pattern. Later than this, alveolar bone will not stabilize at the remodeled position of expansion, and will later replapse.

The limit of Mn canine expansion should be seen as no more than 4mm. during this early mixed dentition period.

Factor 4: Inclining lower incisors labially to correct crowding: The general rule is that for each degree the central incisors are uprighted to the labial, .5mm. is gained in the arch length from canine to canine. Therefore, if the teeth are already inclined to the labial limits of their alveolar support, some other method must be considered for un crowding the anterior teeth. *(Obviously, lip relations to the E-plane and other features of the patient's profile must be considered also, but here we are considering predominantly cast diagnosis).*

Factor: Non-extraction distalization of Mx 6-year molars using sagittal appliances to gain space to uncrowd anterior teeth:

If no 12-year molars are to be extracted, the usual limit that is placed on distalization of upper 6-year molars using sagittal appliances is 4mm. on each side. To try to distalize maxillary first molars further than this may create excessive buccal displacement of the 12-year molars.

Loss of anchorage in the anterior segment of teeth and bone when these sagittal forces are applied depends on the depth of the palatal vault and the design of the sagittal appliance. The deeper the vault, the better the anterior bony anchorage, which lessens potential for loss of anchorage in the anterior segment. Loss of anchorage should be checked constantly during the treatment visits by use of dental floss stretched against the patient's face between the anterior border of the nare (nose opening) and the soft tissue border or the chin (pogonion). If the lips move labially during treatment in relation to this E-plane, a loss of anchorage may be occurring and the mechanics of treatment should be altered.

Factor 6: Distalization of Mx 6's following extraction of 12-year molars: The limit that is usually placed on distalization of the upper 6's following extraction of 12-year molars is 6mm. on each side. In some cases more can be gained, but it is difficult to plan on this increased gain.

Factor 7: Limitation on distalizing Mn 6-year molars in non-extraction cases using sagittal or lip-bumper appliances:

The fact must be faced that distalizing lower first permanent molars is one of the most difficult tasks in orthodontics. Although several fixed and fixed-removable sagittal appliances have been recently devised to gain vital space needed in the lower arch, these appliances may create an undersirable loss of anchorage in the lower anterior teeth, resulting in their severe inclination to the labial and opening of the incisor bite relation.

Factor 8: Limitations on distalization of Mn 6-year molars following extraction of lower 12-year molars:

Usually 12-year molars are extracted in patients where teeth are severely crowded, but the lips are in good relation to the esthetic plane (E-plane), and the patient presents a good profile. The dentist may feel that loss of lip support during treatment when the first bicuspids are extracted will be unacceptable esthetically. Extraction of the lower 12-year molars, followed immediately by distalization forces created either by a distal drive sagittal appliance or by a well-designed lip bumper may provide the best chance of uncrowding without loss of anterior an-

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chorage. Probably no more than 2mm. of lower molar distalization on each side should be expected in most cases, although in some instances as much as 4mm. may be gained on each side.

Recent articles from orthodontic literature paint a darker picture of lower molar distalization possibilities, but these views do not take into account the many recent design changes in orthopedic appliances that have taken place.[11]

Factor 9: Rounding out the anterior teeth with archwires:

When fixed banded/bonded straight wire appliances are placed, a phenomenon known as "rounding out the arch" can occur. Simply by placing a round wire (preferably a NiTi wire) in the arch, a gain of 1-2mm. in arch length is produced without apparent labial movements of the lower anterior teeth.

The problem arises often that there is a desperate need for 2mm. of additional space in a patient where labial "dumping" of incisors must be avoided. The "rounding out" phenomenon is applicable here.

Factor 10: Leveling the Curve of Spee: The Curve of Spee is usually measured from a straight edge surface placed across the model of the lower arch from incisors to the distal of the lower first permenent molar (or permanent second molar if the patient is older). The top of the upper model may be used for the "level", or the handle of the Boley gauge may be used.

Depth of the Curve of Spee is defined as the vertical distance from the tip of the cusp of the mandibular first bicuspid to the level being established from the distal cusp of the lower molar to the incisors.

Most articles and text chapter references to fixed straight wire treatment offer as a guide to the practitioner that the Curve of Spee should be leveled or flattened during orthodontic treatment. When more than 2mm. Curve of Spee depth is present, the "flattening" of the Curve of Spee is likely to cause lower incisors to incline to the labial. The accepted rule is as follows:

For each millimeter of depth of Curve of Spee that is corrected, the incisors will incline to the labial 1-2 degrees. In other words, for each millimeter of Curve of Spee, it is as if the arch is being uncrowded one millimeter. There have been fewer instances of labial dumping of the lower incisors when "reverse curve" archwire mechanics are used, since the incisors appear to be intruded during the leveling process rather than labially inclined.

One successful method that may be used to avoid "dumping" lower incisors to the labial while correcting the Curve of Spee is to flatten the archwire anterior arc that is tied in to the mandibular anterior teeth. This has the effect of expanding the lower canines **facially,** and uprighting the lower incisors **slightly lingually.**

Factor 11: Congenitally missing Mx lateral incisors:

When even one upper lateral incisor is congenitally missing, and the primary lateral has also been lost, there may be as much as 7mm. of bone missing from the anterior portion of the maxillary alveolar ridge. Even though the posterior body of the maxillary complex may be normal in its relation to the mandible, the anterior portion may be deficient enough in its forward pattern of growth to mimic a Class III growth pattern. When two maxillary lateral incisors are seen to be congenitally missing, the problems of missing bony support and exaggeration of lack of A-P growth of the maxillary complex may lead to severe Class III dental occlusion in the incisor area.

Deciding whether to regain or close congenitally missing upper lateral space:

There is almost always a problem deciding whether to open space of the congenitally missing upper lateral incisor so that a pontic of some kind may be placed, or whether to close space and remove the need for the costly pontic. Usually it is better to decide after two separate factors are considered.

a. Esthetics of the patient's smile:

If the space has been partially or completely closed by the natural growth process and migration of teeth, the dentist can judge whether the resulting smile is more esthetic than a wider smile would be with space opened orthodontically to provide for the pontic. In general, the dentist should choose the option of the wider smile.

b. Shape, shade, and position in the arch of the canines:

A second consideration involves not the space, but the esthetics of the mesially migrated canine: Is its shape, shade, and position in the arch compatible with the recontouring of its incisal surface so that it more nearly resembles a lateral incisor? If any of these queries is answered **NO,** the space should probably be opened orthodontically, and treatment completed with a single tooth implant or a bridge.

Note: If a decision is made tentatively to close the spaces of ***two*** *congenitally missing upper laterals, the result can be a disastrous closing of the vertical skeletal bite. This may lead to immediate TMJ problems in low growth angle cases.*

Factor 12: Congenitally missing lower second bicuspids:

When one or two mandibular second bicuspids are missing, there is a potential severe disruption of the growth angle of the jaws. Considerations are almost too many to enumerate, but the following are

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among major problems in such cases:

a. Root resorption observed in lower deciduous second molars:

If root resorption is not serious in the retained mandibular second deciduous molars (E's), this may be one reason to consider allowing them to remain in place, at least through adolescence. However, if root resorption is well advanced, consideration should be given to removing the faulty deciduous tooth (teeth) and instituting some sort of orthodontic therapy.

b. Ankylosis of roots of E's: Ankylosis of the roots — as determined by both X-rays and percussion with a metal handled instrument — is calcified attachment of the cementum of the roots of a tooth to the alveolar bone. The disappearance of a patent periodontal ligament may not be seen clearly in the X-rays, but the percussion of such teeth with a metal handled instrument will reveal a sharp bony **ping!** instead of the lower toned **pong!** that is emitted by a tooth with a fully operant periodontal ligament. This is called the "Ping-Pong" test by some diagnosticians.

c. Long-term ankylosis: When ankylosis has been acting for some time, and the occlusal surface of the crown of the second primary molar is at the same level as the crest of the alveolus, in most cases this is an indication that the tooth may have to be extracted.

d. Two considerations for root-resorbed or ankylosed teeth:

If the lower E's are either root-resorbed or ankylosed, and extractions are considered, there are again two considerations for treatment:

(1) Growth angle below norm: If the growth angle of the jaws is at norm, or less than norm, the skeletal bite may be closed enough during subsequent orthodontic treatment that a TMJ problem will occur. This, of course, is to be avoided if possible, by maintaining the vertical relation of the jaws that was present at the pre-treatment evaluation. One of the usual cephalometric growth angles is Y-Axis to F-H, but others may be used.

(2) Growth angle greater than norm: If the growth angle of the jaws is substantially greater than norm, in most cases the spaces held by the lower E's can be closed without serious consequences toward TMJ difficulties for the patient. The skeletal bite (vertical relation) may close 2-4 degrees during the orthodontic treatment, but with careful observation at each step in the treatment — and good anchorage control — major TMJ problems can usually be avoided.

(3) Loss of both lower E's: If two lower E's are extracted, and the decision is to close the spaces orthodontically, a severe Class II molar relation will result. If two upper E's are extracted, and the spaces are closed, a severe Class III molar relation may result.

(4) All four E's extracted: If all four E's are extracted, and spaces are closed orthodontically the result can be devastating loss of support of the lips of the patient, as well as a severe diminishing of the growth angle that can produce immediate or future TMJ problems.

Note: When ankylosis of the roots of primary molars occurs, these teeth are not carried occlusally by the growth process that adds incremental height to the alveolar ridge. Therefore, some ankylosed primary teeth are said to be "submerged". In reality, of course, they have been prevented from erupting toward the occlusal in concert with the other teeth in the arch.

Factor 13: Congenitally missing mandibular central incisor: When a lower permanent central incisor is seen to be congenitally missing, the incisor overjet is automatically increased according to the dimension of the width of the missing central. This may promote a Class II incisor relation in a patient who possesses basically a Class I molar and skeletal relation.

Factor 14: "Slimming" or "stripping" of proximal surfaces of teeth in an arch to gain space: If individual teeth are "slimmed" on their contacting surfaces, additional space may be gained to uncrowd teeth. Although Air Rotor Stripping (ARS) techniques have proliferated during the past ten years, it is probably best to use more conservative methods of reducing the mesial-distal dimension of teeth in younger patients until a great deal of experience has been gained. Also, it is considered necessary to place separators between the teeth whose proximal surfaces are to be slimmed, so the practitioner can fully view the approximating surfaces of the teeth to be slimmed. Usually, the separators need to be in place for at least a week to provide for full separation. Full visibility into the proximal areas must be available, no matter which method of enamel reduction is being planned.

a. Space to be gained in the lower arch by slimming: It may be best to consider that each lower incisor can only be slimmed .25mm. on each proximal surface, while canines and bicuspids can be slimmed as much as .5mm. on each proximal surface. If this were to be carried out on the entire lower arch, approximately 7mm. of space could be gained.

b. Space to be gained in the upper arch by slimming:

In most individuals, a slightly greater amount of space can be gained by slimming the teeth in the maxillary arch, as much as 8mm. **CAUTION:** In almost all cases, the usual uncrowding mechanics should be attempted first, before "slimming" of teeth is done. In fact, it probably should be limited to adult patients.

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Other factors such as exfoliated teeth from injuries or carious activity, endodontically treated teeth, and aberrant growth factors pose such a range of treatment choices that they do not fit into this more discrete list of defined problems.

Diagnosing molar and canine relations:

Molar relations: In the 20-value Computerized Analysis relations of upper molars to lower molars is measured by a new method due to the necessity to alter all measurements to **millimeters** instead of 25% Class II or other similar assessments, then entered into a computer. Positions of the tips of the mesio-buccal cusps of upper 6-year molars are scribed lightly onto the lower cast when the models are in occlusion. If the mark is forward or mesial to the buccal groove of the Mn 6-year molar, a plus millimeter measurement is entered on the chart.

If the mark is posterior or distal to the buccal groove of the lower 6-year molar, a minus millimeter measurement is entered on the chart.

The Super-Class I relation of molars is seen as a measurement of minus 3mm., or -3mm. This is half-way to the position that is usually noted as full Class III molar relation, or -6mm.

In most fixed straight wire orthodontic therapy, the goal is to finish cases with both upper 6-year molars at or near the Super-Class I relation. Later, the upper posterior teeth migrate forward and achieve occlusion in full Class I intercuspation by interproximal wear and other factors.

Canine relations: The tips of the upper canines are also scribed onto the lower cast, but not entered on the chart. In many cases of pre-treatment Class I occlusion, the upper canines will show 3 to 4mm. of Class II relation, while the molars will show near Class I intercuspation. This is one of the reasons why upper molars need to be finished in a Super-Class I relation in most patients. Otherwise, the final intercuspation of canines and bicuspids cannot be properly realized.

Please see Figures 4-A, 4-B, 4-C, 4-D: Note pencil marks indicating incisor over-bite, and canine and molar A-P relations, allowing millimeter measurements to be taken of each value.

Summary:

By reviewing the foregoing information carefully, it will be seen that CAST DIAGNOSIS can be accomplished using a number of different methods. This article has attempted a thorough review of the new approach available through the Sim Record Cast Analysis. This new approach appears to provide a much clearer analysis of a patient's orthodontic record casts for the dentists and orthodontists who intend to start their treatment using functional-orthopedic appliance therapy, followed by a later finishing phase of fixed straight wire treatment.

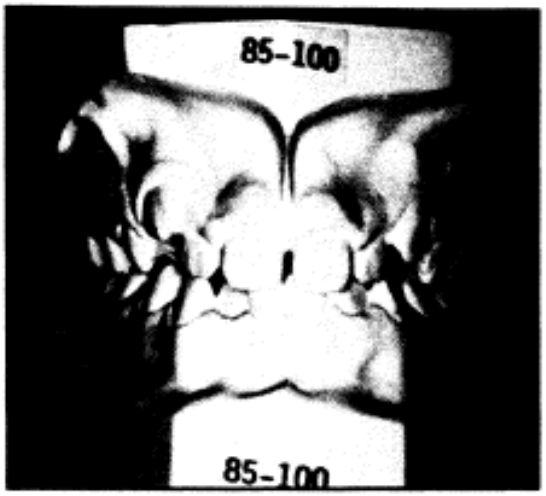

Figure 4-A: Orthodontic casts in occlusion... *Front, Closed.*

Figure 4-B: Note the midline mark and the marks on lower incisors indicating amount of over-bite... *Front, open.*

Perhaps the best definition of diagnosis ever proposed is: "Diagnosis is a series of small steps during which a **decision** is made at each step, so that an accurate evaluation of the patient's problems is made easier, resulting in better oriented treatment for the patient." Author unknown.

The Sim Record Cast Analysis has been designed to record these small steps in a slightly different and more efficient manner, resulting in a clearer view of the treatment needs of the patient.

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Note: Assistance in setting up the Pont's and Schwarz Analyses was offered by Mark Ohlendorf, President of Ohlendorf Orthodontic Laboratory, St. Louis, and is gratefully acknowledged.

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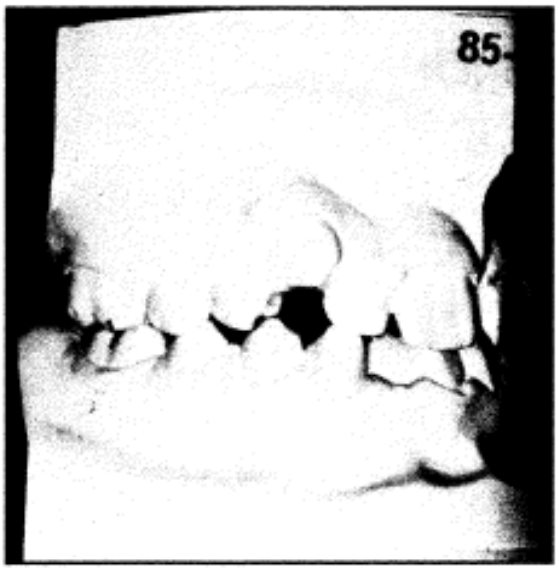

Figure 4-C: Orthodontic casts, *Right side.* Note marks of location of mesial-buccal cusp of upper molar's relation to buccal groove of lower molar.

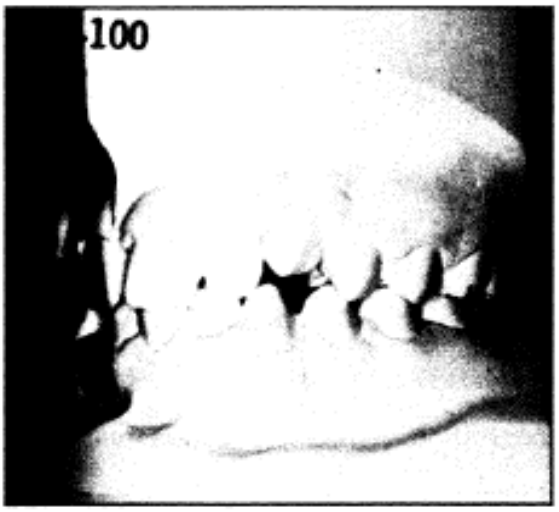

Figure 4-D: Orthodontic casts of same patient. Note molar-to-molar relation marks. *Left side.*

Refrences

1. Witzig, J.W. and Spahl, T.J.: The Clinical Management of Basic Maxillofacial Orthopedic Appliances, Vol.1; pp. 1-31.
2. Moyers, R.E.: Handbook of Orthodontics, Ed. 3, Chicago, 1973, Year Book Medical Publishers, pp. 374-376.
3. Graber, T.M.: Current Orthodontic Concepts and Techniques, Vol. I, Philadelphia, 1969, W.B. Saunders Co., pp. 1-55.
4. Profitt, W.R.: Contemporary Orthodontics, 1986, C.V. Mosby Co., pp. 136-137.
5. Sim J.M.: Minor Tooth Movement In Children, Ed. 2, St. Louis, 1977, C.V. Mosby Co., pp. 58-81.
6. Schwarz, A.M. and Gratzinger, M.: Removable Orthodontic Appliances, 1966, W.B. Saunders Co., Philadelphia; pp. 63-66.
7. Chun-Hoon, A.: An Analysis of Oriental Dentofacial Relationships, 1963. A Master's Thesis in Orthodontics, p. 22. Personal communication with author who resides in Hawaii, April, 1991.
8. Lin, J.J.: Collection of Orthodontic Literature (In Chinese, with English chapter summaries); p. 125.
9. Fournier, A.; Olivier, M.; and Bernard, C.: Early estimation of upper lateral incisor width, J. Clin. Orthod., Oct. 1990, pp. 640-643.
10. Sanin, C.; Sekigouchi, T.; and Savara, B.S.: A clinical method for predicting closure of the central diastema, J. Dent. Children. 36:415-418, Nov. -p Dec., 1969.
11. Romanides, N.; Servoss, J.M.; Kleinrock, S.; Lohner, J.; Anterior and posterior dental changes in Second Molar extraction cases. J. Clin. Orthod., Oct. 1990, pp. 559-563.

The Officers and Directors of the International Association for Orthodontics and the American Orthodontic Society extend warm wishes to each of their members for a

Joyous Holiday Season

and a

Healthy and Prosperous New Year!

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The Case Against Early Extraction of Mandibular Primary Canines

by Charles D. Atkinson, D.D.S., M.S.D.

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The case against early extraction of mandibular primary canines

Charles D. Atkinson, DDS, MSD

Many practitioners believe early extraction of mandibular primary canines should be a significant part of interceptive orthodontic treatment. This article discusses the advantages and disadvantages of this treatment strategy.

Early extraction of the mandibular primary canines can result in detrimental changes to the facial profile that may be undesirable and, often, virtually unalterable. One of the most disconcerting types of cases we have to treat is the case in which iatrogenic damage equals or exceeds the existing malocclusion. In dealing with a growing face, a practitioner is often given cause to reflect on whether treatment has been adequate or even beneficial for a given patient.

This article discusses a subject that is generally neither well understood or appreciated. The transition from the primary to the adult dentition is marked by a period of dynamic change occurring within the oral cavity, particularly during the period from the early to the late mixed dentition. At some time, after or during the eruption of the four mandibular incisors, many patients have evidence of dental crowding, often to the point of generating great parental concern. This time, after the eruption of the mandibular incisors and before the eruption of the mandibular permanent canines, between ages 7 and 10, is critical in the development of the dentition and resulting facial profile. Regarding the early loss of deciduous teeth, canines specifically, the orthodontic literature runs the gamut from recommending premature extraction to alleviate crowding, to stating that space maintenance may be a disservice to these patients,[1] to stating that "Leaving out the space maintainer will almost certainly tend to drive the case in the direction of the need for subsequent removal of permanent teeth."[2]

I believe mandibular deciduous canines should not be extracted indiscriminately. Figures 1-3 show patients who have had early extraction of primary canines.

In a recent study[3] of 22 cases to determine the effect of extraction of primary canines on the Incisor Mandibular Plane Angle (Tweed), it was concluded that: "the extraction of primary canines without a thorough orthodontic workup . . . is strongly discouraged"; and "one can expect to lose IMPA or arch circumference after extraction of the primary canines, if the child presents with an initial FMIA of 64° or less." This space loss is often significant enough to result in the impaction of the permanent canines. Patients who have considerable spacing in the mandibular arch or cases that show considerable labial inclination of the mandibular incisors may not show this because, generally, dentitions with an excess of space will tend not to lose space as readily as crowded dentitions.[4] Likewise, these cases generally do not show an apparent need for early extraction. Moorrees and Chadha[5] found that some crowding of the mandibular incisors at this age was normal in both boys and girls, especially while the primary canines and molars are still present.

The ironic aspect of this situation is that patients who generally appear to require early extraction of the mandibular primary canines because of initial crowding of the mandibular incisor teeth are too often the very patients who should not have these teeth extracted. Many of these patients, particularly those with low mandibular plane angles (20° to 25°), have a hyperactive mentalis muscle, which creates some flattening of the profile

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Fig 1 ■ Left, full-face photograph of patient at initial examination. Right, patient after repositioning of maxillary and mandibular anterior teeth.

Fig 2 ■ Left, photograph of patient at initial appointment; note lip strain on closure. Right, patient after realignment of mandibular incisors and maxillary retraction.

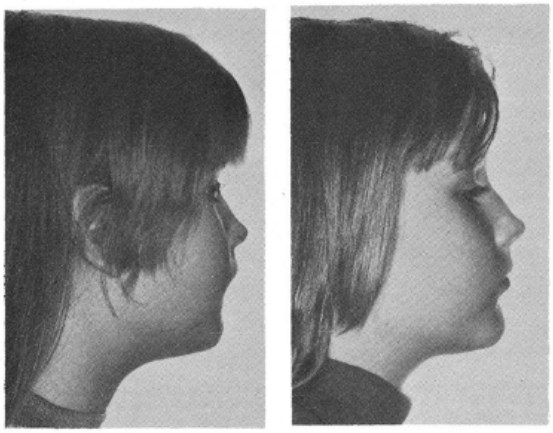

Fig 3 ■ Left, side view of patient at time of initial records; note recessive lower lip. Right, patient after completion of first phase of orthodontic treatment.

through retroclination of the mandibular incisors. The extraction of the primary canines then permits even further distolingual repositioning of the mandibular incisors. This may cause the orthodontist to treat an already over-retracted mandibular incisor position that was established before active treatment is undertaken. Thus, the first and decisive step toward "flattening of the profile" is often taken before the orthodontist becomes a part of the decision-making process.

Also, if the root of the primary canine acts as a functional matrix for the formation and maintenance of alveolar bone, then it is evident that, in a lateral dimension, there would be less alveolar bone and therefore less available space for eruption of the permanent canines after removal of their primary analogs. The overly crowded case, therefore, would hardly benefit from early removal of the roots of the primary canines. Other remedial procedures, such as disking of the primary canine, primary first molar, or primary second molar should definitely be attempted first in these cases.

The clear admonition to the orthodontist who treats cases according to the axiom of positioning the mandibular incisors labiolingually, where they are found, is obvious. The history and development of the malocclusion of the individual patient must first be reevaluated. The requirements of cases that have iatrogenic over-lingualization of the mandibular anterior teeth might change from an extraction to a nonextraction treatment plan, provided an adequate dental history is obtained, and thorough scrutiny of the orthodontic records (including a thorough cephalometric analysis) is completed.

It can be determined from the cephalometric analysis if a child has a strongly clockwise or strongly counterclockwise growth pattern according to the method advanced by Björk.[6] It has been proposed that patients having strongly counterclockwise growth patterns generally benefit from a nonextraction treatment approach.[7] If the patient has a strongly counterclockwise growth pattern, premature extraction of primary canines could be disastrous for the patient, resulting in a permanently increased vertical overbite or a concave facial profile. Early limited mechanotherapy involving interrupted or segmental lower arches, headgear, or lower bumpers may be indicated in certain of these cases, to prevent or recover from over-distalization of the mandibular anterior teeth. Examples of the results of this approach are shown in Figures 1-3.

Although the angular and linear positions of the mandibular incisors can be useful guides as to what positions will be stable for them, they are far from absolute. If the mandibular incisors have been permitted to shift to a far more lingual position because of premature extraction of the mandibular canines, positioning the denture anteroposteriorly according to the position of the lower incisors at the time of taking original orthodontic records will certainly result in a flattening of the profile and disharmonous facial esthetics. The concept that mandibular incisors cannot be moved labially because that will be an unstable position for them has to be subject to question in cases in which mandibular primary canines have been extracted prematurely. It is my opinion that labial advancement is not only stable, but highly preferable in many of these cases. Also, the concept that space maintenance is indicated in the mandibular arch only in the event of loss of the primary first molars or second molars is open to question and does not take into consideration the possible lingual movement of the lower incisors following early loss of the mandibular primary canines.

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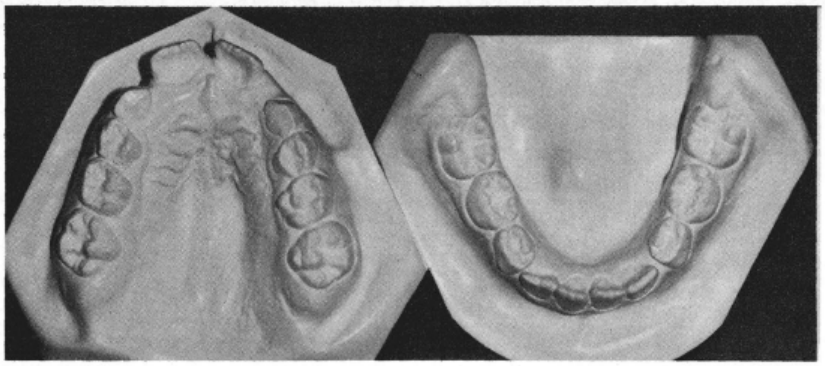


Fig 4 ■ Note large overjet and apparent leaning-in of mandibular incisors; primary canines were extracted early.

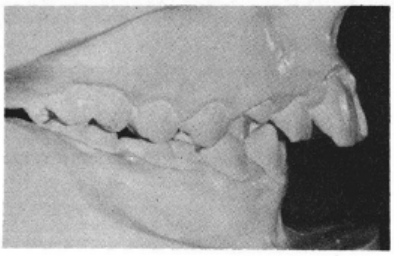
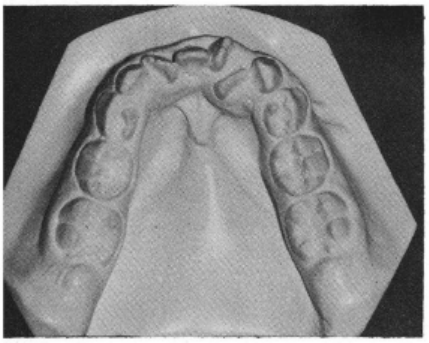


Fig 5 ■ Case in which lower lateral incisors have migrated distally to be in contact with primary first molars.



ig 6 ■ Crowding has resulted in complete rotation of mandibular left central incisor. Primary canines were extracted.

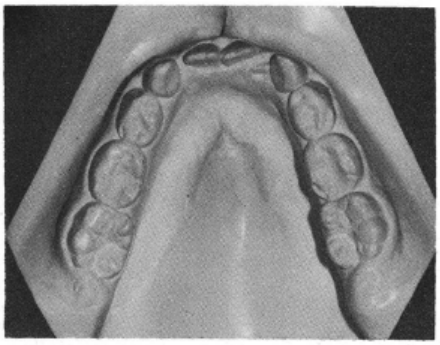


Fig 7 ■ Extreme crowding; eruption of lateral incisors is blocked. Primary canines extracted.

The value of an early orthodontic case analysis, treatment plan, and consultation cannot be overestimated. It may result in the complete modification of a treatment plan which, otherwise, the operator may have become committed to early, and which would be doomed to eventual failure anyway; elimination of the need for loss of four or more teeth; shortening of time required to accomplish full-banded treatment; or the elimination of need for full-banded treatment altogether.

In dealing with these cases over the past six years, I have observed that four things consistently happen when the mandibular canines are extracted early: the mandibular incisors move distally and lingually (Fig 4); the vertical overbite deepens (Fig 5); the horizontal overjet increases (Fig 5); and the facial convexity is increased (Fig 3). Lip incompetence may be created or exacerbated as a result of this procedure (Fig 1-3). Another possibility is that the mandibular permanent canines may become impacted, necessitating the extraction of permanent first premolars (Fig 4). At best, early extraction of the mandibular primary canines generally only accomplishes two purposes: a temporary realignment of the permanent mandibular incisors, and creation of the illusion in the minds of the parents that no serious crowding problem exists. It is open to question how many adult Class II, division I malocclusions may have been exacerbated by extraction of their primary mandibular canines at age 7 or 8. I have never seen a case in which 1 ml of arch length was gained from early extraction of the mandibular primary canines; nor was any case made easier to treat in the permanent dentition. In virtually every case, extraction of the canines made a bad situation worse, and increased the severity of the arch length discrepancy.

There are cases in which extraction of the mandibular primary canines is indicated. Severe gingival stripping of the erupted mandibular incisors, or the existence of an arch length discrepancy so great that it results in the complete blockage of one or both permanent lateral incisors would constitute such indications. Figures 6 and 7 show occlusal views of mandibular arches where extraction of the primary canines was appropriate.

Conclusions

Early crowding of the mandibular incisor teeth, gingival stripping, or development of a deep anterior overbite are all primary indications for an early orthodontic evaluation and consultation. Cephalometric analysis including an evaluation of the growth pattern (clockwise vs counterclockwise) and linear and angular measurements of the position of the mandibular incisors should be done for all children who show early signs of mandibular anterior crowding before extractions. Extractions of mandibular primary canines should not be undertaken merely at the request of concerned parents.

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1. Graber, T.M. Orthodontics: principles and practice, ed 3. Philadelphia, W. B. Saunders Co, 1972, p 363.

2. Hitchcock, H.P. Orthodontics for undergraduates. Philadelphia, Lea & Febiger, 1974, p 255.

3. Mueller, B.H., and others. The effect of primary canine extraction on the IMPA. J Dent Child 45:461-464, 1978.

4. Hill, C.J.; Sorenson, H.W.; and Mink, J.R. Space maintenance in a child dental care program. JADA 90:811, 1975.

5. Moorrees, C.F., and Chadha, J.M. Available space for the incisors during dental development—a growth study based on physiologic age. Angle Orthod 35:12-22, 1965.

6. Jarabak, J.R., and Fizzell, J.A. Technique and treatment with light-wire edgewise appliances, ed 2. St. Louis, C. V. Mosby Co, 1972, pp 139-158.

7. Isaacson, J.R., and others. Extreme variation in vertical facial growth and associated variation in skeletal and dental relations. Angle Orthod 41(3):219-229, 1971.

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Orthodontic Abbreviations & Glossary

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Orthodontic Abbreviations

Below is a list of abbreviations commonly employed when documenting a chart or communicating with another orthodontic professional. In orthodontics, the mouth is divided into four quadrants, rather than the traditional numbers 1 to 32. The central is referred to a 1, the lateral as 2, and so on. So a few examples would be upper right 5 = #4; Upper left three = # 11; Lower left 8 = #17; and lower right six = #30. There are a number of ways to abbreviate orthodontic words. This is how I prefer to abbreviate some of the words.

MX	Maxilla
MN	Mandible
AC	Accentuated curve
RC	Reversed curve
CB	Cinch Back
BRT	Buccal Root Torque
LRT	Lingual Root Torque
BCT	Buccal Crown Torque
LCT	Lingual Crown Torque
OCS	Open Coil Spring
CCS	Closed Coil Spring
PC	Power Chain
Ch E	Chain Elastics
Niti	Nitinol
SS	Stainless Steel
C Niti	Copper Nitinol
T Niti	Thermal Nitinol
RW	Rotation Wedge
Brkt	Bracket
Band	Band
Bond	Bond
1°	First Order Bend
2°	Second Order Bend
3	Third Order Bend
Pl Spr	Pletcher Spring
K-hooks	kobayashi hooks
X-arch E	Cross Arch Elastics
Lt E	Light Elastics
Med E	Medium Elastics
MDA	Multi Distalizing Arch Appl
FRLA	Fixed Removable Lingual Arch
PE	Palatal Expander
NPE	Nitinol Palatal Expander
RPE	Rapid Palatal Expander

Big D	Big Daddy
LB	Lip Bumper
But	Buttons
UT Wire	Utility Wire
Lig	Ligature
Donuts	Safe-t-ties
ML E	Midline Elastics
Cl II E	Class II Elastics
Cl III E	Class III Elastics
TTN	Tighten
Ret	Retainer
Bnd 3x3	Bonded 3x3 retainer
MHS	Molar Hook Stop
Uprht	Upright
TAT	Touching All Teeth
Hbst	Herbst
JJ	Jasper Jumper
1/	Upper Central Incisor
/1	Lower Central Incisor
POH	Poor Oral Hygiene
OHI	Oral Hygiene Instructions
Txfr Pt	Transfer Patient
Plq Discl soln	Plaque Disclosing Solution
N/V or N/A	Next visit or next appointment
△	Thermal

These abbreviations are commonly used when documenting a chart or communicating with another orthodontic professional. Some of this shorthand is not available in digital charting.
In orthodontics, the mouth is divided into four quadrants, UR, UL, LL and LR. The tooth numbers are designated in Palmer notation. For example, #6 is UR3.

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Orthodontic Glossary

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- A -

A See Point A (subspinale).

AAO See American Association of Orthodontists.

AAOF See American Association of Orthodontists Foundation.

AAOIC See American Association of Orthodontists Insurance Company.

AAOSI See American Association of Orthodontists Services, Inc.

ABO See American Board of Orthodontics.

abfraction The pathologic loss of hard tooth substance caused by biomechanical loading forces. Such loss is thought to be due to flexure and chemical fatigue degredation of enamel or dentin at a site distant from the site of actual point of loading.

abrasive 1. a substance used for abrading, smoothing or polishing. 2. tending to abrade, causing irritation.

abrasive strips Thin flexible tapes or strips that are coated with abrasive particles of different grain size and are used to remove, polish and finish tooth contours. These are usually used for interproximal reduction. They can be polyester, stainless steel or diamond abrasive strips.

acromegaly (from Greek akros “extreme” or “extremities” and megalos “large”) A disease caused by increased activity of the anterior pituitary producing excess growth hormone (hGH) after epiphyseal plate closure and characterized in part by a marked lengthening of the mandible.

acrylic Methyl methacrylate, an organic resin commonly used for the construction of dental appliances, including appliances for active orthodontic tooth movement.

activation The process of deforming an appliance or a part of an appliance from its passive state (e.g., the stretching of an elastic) and completing its engagement to produce a force system transmitted by the appliance to the dentition.

activation site The intraoral location of the activating process, often where the orthodontic force system is to be transmitted to the dentition.

activator 1. A removable growth guidance orthodontic appliance, originally developed by Pierre Robin, Viggo Andresen and Karl Haupl, with later modifications by Schwarz, Bimler, Balters, Frankel, Fleischer, Peters, etc. It is a type of functional appliance. 2. a chemical agent which triggers an initiator chemical to begin a chemical reaction.

Adams clasp A circumferential retention clasp (see crib) designed by C. Philip Adams to stabilize removable appliances by means of point contact with the mesio- and disto-buccal undercuts of individual buccal teeth.

adenoid face See long-face syndrome.

adenoidectomy The surgical removal of the adenoids. They may be removed for several reasons which include impaired nasal breathing and chronic infections or earaches.

adenoids Lymphatic tissue that forms a prominence of the wall of the pharyngeal recess of the nasopharynx.

adhesive resin Any resin material with incorporated adhesive chemicals such as organophosphates, HEMA (hydroxyethyl methacrylate), or 4-META (4-methacrylethyl trimelletic anhydride); in orthodontics and dentistry, it describes the luting agent used with composite resins to bond (e.g. brackets) to the tooth structure.

adolescent dentition See dentition.

adult dentition See dentition.

agenesis A failure of development. For example tooth agenesis (lack of tooth development), condylar agenesis (lack of condylar development).

agnathia A developmental anomaly characterized by the lack of development of the mandible.

air abrasion The process of altering the surface of a material by the use of abrasive particles which are propelled by compressed air.

alloy A mixture of two or more metals or metalloids that are mutually soluble in molten state. It can be binary, ternary, quaternary etc. depending upon the number of metals in it. Alloying elements are added to alter the physical properties of a pure metal. Alloys can also be classified based on their behavior such as- noble metal, base metal etc.

alveolar bone The bone that surrounds and supports the roots of the teeth.

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alveolar process The unshaped ridge of maxillary or mandibular alveolar bone that surrounds and supports the roots of the teeth.

amalgam Dental amalgam is an alloy of mercury, silver, copper, tin, zinc that is used for restorative procedures.

American Association of Orthodontists (AAO) The AAO is a professional association of educationally qualified orthodontic specialists dedicated to advancing the art and science of orthodontics and dentofacial orthopedics, improving the health of the public by promoting quality orthodontic care, and supporting the successful practice of orthodontics.

American Association of Orthodontists Foundation (AAOF) The AAOF, a 501(c)(3) organization, is the charitable arm of the AAO. The AAOF raises money for an endowment the earnings from which are used to support orthodontic research and teaching fellowships.

American Association of Orthodontists Insurance Company (a Risk Retention Group) (AAOIC) The AAOIC provides professional liability insurance for eligible United States members of the AAO. AAOIC is unique in that coverage is only available to AAO members and only orthodontists are insured by the company. The policyholders are also the shareholders of the Company. AAOIC is governed by a group of dedicated orthodontists and other experts who have one goal in mind: to provide a stable, efficiently run professional liability insurance company designed specifically to meet the unique needs of the AAO member orthodontists. See Risk Retention Group.

American Association of Orthodontists Services, Inc. (AAOSI) The AAOSI is the for-profit subsidiary of the AAO, dedicated to the evaluation and management of services that benefit the members' pursuit of professional success and financial security through quality insurance products and other services.

American Board of Orthodontics (ABO) The ABO is recognized by the American Dental Association as the official certifying body for the specialty of orthodontics. Though sponsored by the American Association of Orthodontists, it is a separate and autonomous entity. The mission of the ABO is to establish and maintain the highest standards of clinical excellence in orthodontics.

anchorage Resistance to force. Anchorage may come from any of the following sources: intraoral – teeth, bone, soft tissue, implants; extraoral – cervical = back of the neck, occipital = back of the head, cranial = top of the head.

Andresen appliance See activator.

Angle classification of malocclusion A classification of malocclusion introduced by Edward H. Angle (1855-1930). The governing criterion is the anteroposterior relationship of maxillary and mandibular first molars.

> **Class I malocclusion** (neutroclusion) A malocclusion in which the mesiobuccal cusp of the maxillary first molar occludes in the buccal groove of the mandibular first molar. "Class I" is sometimes incorrectly used as a synonym for normal occlusion, whereas it signifies only a normal sagittal relationship of maxillary and mandibular posterior teeth as they meet.
>
> **Class II malocclusion** (distoclusion) A distal (posterior) placement of the mandibular (lower) molar, a mesial (anterior) relationship of the maxillary (upper), or a combination of the two. The mesiobuccal cusp of the maxillary first molar occludes mesial to the buccal groove of the mandibular first molar, usually near the embrasure between the mandibular molar and second premolar.
>
> **Class II, Division 1** A Class II molar relationship with proclined maxillary incisors.
>
> **Class II, Division 2** A Class II molar relationship, usually with the maxillary central incisors tipped lingually, the maxillary lateral incisors tipped labially. This malocclusion, in many instances, has and an excessive overbite.
>
> Subdivision of any malocclusion category denotes a unilateral malocclusion classification (e.g. Class II, division 2, subdivision).
>
> **Class III malocclusion** (mesioclusion) Mesial (anterior) relationship of the mandibular first molar to the maxillary first molar, a retruded relationship of the maxillary first molar to the mandibular, or a combination of the two. The mesiobuccal cusp of the maxillary first molar will typically occlude near the embrasure between the mandibular first and second molars.

angular cheilitis Inflammation of the corners of the mouth which causes redness and fissures; also called perleche.

ankyloglossia The attachment of the tip of the tongue to the floor of the mouth or the lingual alveolar ridge. It restricts mobility of the tongue and may lead to a speech impediment. Also called "tongue-tie".

ankylosis Abnormal immobility, union or fusion. May occur between two bones at their articulation (i.e., TMJ) or between teeth and alveolar bone. In the latter case, the periodontal ligament is obliterated by a 'bony bridge' and the tooth root is fused to the alveolar bone. Dental ankylosis prevents both eruption and orthodontic movement. In a growing child, an ankylosed tooth appears to 'submerge' as adjacent unaffected teeth and alveolar bone continue their normal pattern of eruption and growth.

anneal To heat a material in order to remove internal stresses and create a desired degree of toughness, temper or softness to a material.

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anodontia a rare disorder characterized by congenital absence of all teeth (both deciduous and permanent).

anterior deprogramming device Various types of devices or materials used to eliminate the proprioceptive influence on occlusion and mandibular closure.

antegonial notch A concavity usually present in the lower border of the mandible, immediately anterior to the angle of the mandible. A deeper than normal antegonial notch may be indicative of mandibular underdevelopment.

anterior cranial base The anterior aspect of the floor of the cranial vault, commonly delimited cephalometrically by sella turcica and nasion.

anterior guidance 1. The influence of the contacting surfaces of maxillary and mandibular incisors that guides the mandible downward and creates disarticulation of the posterior teeth. 2. The influence of the contacting surfaces of the guide pin and anterior guide table on articulator movements.

anterior nasal spine Pointed bony process at the inferior margin of the piriform aperture, formed by the forward prolongation of the two maxillae. In cephalometric radiography, the tip is often used to define the anterior end of the palatal plane.

anteroposterior The global direction perpendicular to the coronal plane of the dentofacial complex; the anterior direction/sense is forward, and the posterior direction/sense is rearward.

anthropometry Measurement of the human body and its parts.

antiflux Materials that prevent the flow of solder.

apertognathia Condition in which either the anterior or posterior teeth of opposing arch do not contact. See also open bite.

apical Of or pertaining to the apex (usually of the tooth).

apical base Maxillary and mandibular bone that support and are continuous with the alveolar processes (see basal bone). Although the demarcation between alveolar and basal bone is not specific, it is generally considered to lie at the level of the apices of the roots.

apnea A cessation, or near cessation, of respiratory airflow that lasts 10-15 seconds or longer. Also see sleep apnea.

appliance Any device designed to influence the shape and/or function of the stomatognathic system.

fixed appliance A bonded or banded appliance affixed to individual teeth or groups of teeth.

functional appliance Any device, removable or fixed, designed primarily to effect skeletal and/or dental changes by modifying and utilizing the neuromuscular forces of the stomatognathic system (e.g., activator, bionator).

orthodontic appliance Any device used to influence the position of teeth and jaws.

orthopedic appliance Any device used to influence the growth or position of bones.

removable appliance An appliance that can be removed from the mouth and replaced at will by the patient.

arch Collectively, the teeth of either jaw, i.e., the term maxillary arch would include all teeth in the maxillary arch.

alveolar arch The U-shaped alveolar bone that surrounds the dentition of either jaw.

dental arch The composite structure of the dentition and alveolar ridge basal arch.

arch bars A rigid bar used for intermaxillary fixation in treatment of fractures of the maxilla and/ or mandible; or stabilization of injured teeth. These are generally attached to the remaining dentition or occlusal splints.

arch form The geometric shape of the dental arch or of an archwire when viewed in the horizontal plane (square, tapering, ovoid, etc.).

arch length A measurement of available space needed to align the teeth.

arch length deficiency Difference between available and required space to align the teeth (see discrepancy).

archwire A wire capable of causing or guiding tooth movement that is placed into orthodontic attachments which are affixed to the crowns of two or more teeth.

continuous archwire A wire that engages or could engage, through crown attachments, all of the erupted teeth in the maxillary or mandibular dental arch.

sectional or segmental archwire An archwire that engages, through crown attachments, only a few teeth (e.g., only the four incisors or only a posterior dental segment).

arthralgia Pain in a joint(s).

arthritis Inflammation of a joint(s).

articular Of or relating to a joint.

articulare A constructed point on lateral cephalometric films representing the intersection of three radiographic images: the inferior surface of the cranial base and the posterior outlines of the ascending rami or dorsal contour of the mandibular condyle bilaterally (A. Bjork).

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articulating paper Ink coated paper strips which are used to identify occlusal contacts.

articulator A mechanical instrument that represents the temporomandibular joint and the jaws. The maxillary and mandibular casts are attached to it.

asperities Microscopic projections on metal surfaces that result from normal surface-finishing processes. Interference between opposing asperities in sliding or rolling applications is a source of friction, and can lead to metal welding and scoring.

austenitic The name given to the face-centered cubic crystal structure (FCC) of ferrous metals.

autoclave A device that is used for sterilizing equipment and instruments with saturated stream filters with constant high temperature and pressure.

axis of rotation The line in a body (or in an extension of the body) about which the body has or appears to have rotated in a nontranslational displacement.

- B -

B See Point B.

balancing side A term used in the study of occlusion (i.e., for the non-functional side when the mandible is shifted laterally).

band (orthodontic) A thin metal ring, usually stainless steel, which serves to secure orthodontic attachments to a tooth. A band, with orthodontic attachments welded or soldered to it, is closely adapted to fit the contours of the tooth and subsequently cemented into place.

banding An orthodontic procedure during which bands are inserted and cemented onto teeth.

basal bone The bone that underlies, supports, and is continuous with the alveolar process (see apical base).

basal dysplasia A skeletal malrelationship related to a defect in size, shape, or position of basal bone.

basion The anterior margin of the foramen magnum, often used as a landmark on the lateral cephalogram.

Begg appliance A fixed appliance developed by P. R. Begg that uses light forces, round wires and modified ribbon-arch attachments

Beilby layer Eponym for the molecular disorganized surface layer of a highly polished metal. A relatively scratch free microcrystalline surface produced by a series of abrasives of decreasing coarseness.

bends

first order Offsets in the archwire to accommodate the labiolingual and buccolingual thickness of teeth or to produce horizontal forces.

second order Offsets in the archwire in the vertical plane that are used for tipping and/or uprighting teeth.

third order A twist in a rectangular archwire along its long axis that produces torque.

gable, tent bends Bends to upright teeth at extraction sites.

"V" bends Place to mark, solder or twist wire or activate tooth movement.

Bennett movement (Sir Norman G. Bennett 1870-1947) Lateral translation (sideshift) of the working condyle during lateral excursions.

beta-titanium A bcc allotropic form of titanium alloy comprising of titanium, molybdenum, vanadium and trace elements. Beta titanium alloys have a strength/modulus of elasticity ratios almost twice those of 18-8 austenitic stainless steel, larger elastic deflections in springs, and reduced force per unit displacement 2.2 times below those of stainless steel appliances. The titanium alloys have good formability and can be easily welded.

bialveolar protrusion Anterior protrusion limited to the teeth and their alveolar processes.

bilateral Relating to both sides (of the body).

Bimler appliance A modification of the removable activator functional appliance.

biologic width The combined width of connective tissue and junctional epithelial attachment adjacent (part of the gingival complex) to a tooth and superior to the crestal bone.

biomechanics The study of mechanical principles applied to biological functions; the application of mechanical laws to living structures; the study and knowledge of biological function from an application of mechanical principles.

bionator A modified removable functional appliance, developed by Balters to provide better control of the buccal musculature than some other functional appliances.

biostatistics The science of the application of statistical methods to biological facts, as in the mathematical analysis of biological data.

bisphosphonates (also called diphosphonates) are a class of drugs that inhibit osteoclast action and the resorption of bone. Its uses include the prevention and treatment of osteoporosis, ostetis deformans, bone metastasis (witth or without hypercalcemia), multiple myeloma and other conditions that feature bone fragility.

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biteblock An upper or lower removable appliance, usually covering the occlusal surfaces of the teeth, used for vertical control or for TMJ problems.

biteplate or bite plane A removable orthodontic appliance designed to open the bite and/or prevent selected teeth from occluding.

Board Certification An examination program that establishes the clinical competency of a dental specialist according to the procedures established by the individual specialty certification board under the rules and authority of the Council on Dental Education of the American Dental Association. The recognized board in the specialty of orthodontics and dentofacial orthopedics is The American Board of Orthodontics.

Board Certified The status of an orthodontist who has successfully completed all three phases of the certification process administered by The American Board of Orthodontics.

Board Diplomate An orthodontist who has successfully completed all three phases of the certification process administered by The American Board of Orthodontics.

Board Eligible The status of a dental specialist whose educational qualifications have been verified by acceptance of an application for certification by the recognized certifying board and who has passed an initial written examination. Board eligibility is dependent on advanced education in the specialty and on timely progress toward completion of the certification procedure.

bodily movement Translational movement of a tooth or dental segment, ordinarily understood to be perpendicular to the long axis/axes.

Bolton analysis A method developed by Wayne Bolton for the evaluation of tooth-size discrepancies (mesiodistal crown diameter) between the maxillary and mandibular arches.

Bolton Point A landmark, as viewed on the lateral cephalometric film; the highest point on the averaged outlines of the retrocondylar incisures of the occipital bone. It approximates the antero-posterior center of the foramen magnum. It was named in honor of Charles B. Bolton, a patron of the pioneer cephalometric researcher, B. Holly Broadbent Sr.

bonding The process by which orthodontic attachments are affixed to the teeth by an adhesive.

> **direct bonding** An intraoral procedure during which orthodontic attachments are placed on a tooth surface directly.
>
> **indirect bonding** A two-step process by which orthodontic attachments are affixed temporarily to study cast teeth and then transferred en masse to the mouth by means of a molded matrix that preserves their predetermined orientation and permits them to be bonded simultaneously.

braces See fixed appliance.

brachycephalic Cranial form characterized by a large width (broad head). The cephalic index is greater than 81.0; the opposite of dolichocephalic.

brachyfacial (brachyprosopic) A facial pattern characterized by a broad, square face; preferred term is euryprosopic.

brazing A joining process wherein coalescence is produced by heating to suitable temperatures above 800°F and by using a non-ferrous filler metal having a melting point below that of the base metals. The filler metal is distributed between the closely filled surfaces of the joint by capillary attraction. See also soldering.

bruxism 1. the parafunctional grinding of teeth. 2. an oral habit consisting of involuntary rhythmic or spasmodic non-functional gnashing, grinding or clenching of teeth, in other than chewing movements of the mandible, which may lead to occlusal trauma, attrition of the teeth, muscle ischemia, pain and damage to the supporting tissues. It is also called tooth grinding or occlusal neurosis.

bracket An orthodontic attachment that is secured to a tooth (either by bonding or banding) for the purpose of engaging an archwire. Brackets can be fabricated from metal, ceramic or plastic.

buccal Toward the cheeks.

buccoversion Buccal malposition of a tooth or groups of teeth.

- C -

canine guidance A form of mutually protected articulation in which the vertical and horizontal overlap of the canine teeth disengage the posterior teeth in lateral excursive movements. Also called canine protected occlusion.

capitation dentistry A capitation dental program is one in which a dentist or dentists contract with the program's sponsor or administrator to provide all or most of the dental services to subscribers who are covered under the program in return for payment on a per capita basis.

cast (dental) A plaster replica (plaster model) of the teeth and surrounding tissues, typically made from an alginate impression and used for diagnosis, treatment planning and appliance fabrication. It is a part of the patient's permanent record.

cast (metallurgical) To produce a shape by thrusting molten liquid or plastic material into a mold possessing the desired shape. Used to make cast appliances, brackets etc.

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CDABO See College of Diplomates of the American Board of Orthodontics.

center of resistance The center of resistance (CR) of a tooth is the point of concentrated resistance to movement. A force that acts on a body at CR causes a tooth to translate in the direction of the line of force without rotation. The center of resistance can be considered an area rather than a point in three dimensions. In free space, the CR is the center of the tooth which happens to correspond to the center of gravity of the tooth.

center of rotation The point about which a body appears to have rotated in a nontranslational plane (two-dimensional) displacement.

centric occlusion Mandibular position dictated by maximum and habitual intercuspation of the maxillary and mandibular teeth; variously referred to as intercuspal position, habitual centric, usual occlusal position. The condylar position may or may not be in harmony with centric relation. Because of this, the term habitual occlusion is preferable. Historically, a gnathologic and articulator oriented term.

centric relation A gnathologic term that denotes optimal condyle-articular eminence-glenoid fossa relationships, determined by muscle balance and independent of tooth intercuspation. Changing concepts no longer accept the most retruded, rearmost or hinge axis definition, originally derived from prosthetic articulators. To the orthodontist, the condylar position can vary somewhat, but is generally recognized as high on the posterior surface of the articular eminence. Lack of harmony of centric occlusion and centric relation status is particularly important in diagnosis of TMJ problems.

cephalic index The ratio of the maximum width of the head to its maximum length (i.e., in horizontal plane), sometimes multiplied by 100 for convenience. The head shape can be characterized as either dolichocephalic (long headed), mesocephalic (moderate headed), or brachycephalic (broad headed).

cephalogram A term used as a synonym for cephalometric radiograph.

cephalometer An instrument developed from the anthropologic cephalostat, used now on patients to obtain standardized and oriented craniofacial images on radiographic film. The design of the instrument permits longitudinal study with minimal positional and magnification error.

cephalometric analysis The process of evaluating dental and skeletal relationships by way of measurements obtained directly from the living head or, more commonly, from cephalometric radiographs and tracings. Refers also to the standardized sets of cephalometric measurements (e.g., Downs Analysis) commonly used in the evaluation.

cephalometric landmarks Points on a cephalometric radiograph or tracing representing certain hard or soft tissue anatomical structures (anatomical landmarks) or intersections of lines (constructed landmarks).

A point Subspinale (Downs) The deepest (most posterior) midline point on the curvature between the ANS and prosthion.

ANS anterior nasal spine The tip of the bony anterior nasal spine at the inferior margin of the piriform aperture, in the midsagittal plane.

AR articulare A (Bjork) constructed point representing the intersection of three radiographic images: the inferior surface of the cranial base and the posterior outlines of the ascending rami or dorsal contour of the mandibular condyles bilaterally.

B point (Downs) The deepest (most posterior) midline point on the bony curvature of the anterior mandible, between infradentale and pogonion. Also called supramentale.

Bolton point (Broadbent) The highest points on the outlines of the retrocondylar fossae of the occipital dome, approximates the center of the foramen magnum.

Co condylion The highest point on the superior outline of the mandibular condyle.

glabella The point between the superciliary arches in the midline.

gnathion The most anterior-inferior point on the chin; a cephalometric landmark in the lateral view.

GO gonion The most posterior inferior point on the outline of the angle of the mandible. In cephalometrics, it is identified by bisecting the angle formed by the tangents to the mandibular corpus (mandibular plane) and posterior border of the mandible (dorsal ramal plane); when both the angles of the mandible appear on the sagittal cephalometric radiograph, a point midway between the right and left side is used.

incision superius Incisal edge of the maxillary incisor.

incision inferius Incisal edge of the mandibular incisor.

infradentale The highest and most forward point of the alveolar process between the mandibular central incisors.

key ridge The most inferior point on the zygomatic process of the maxilla as seen in a lateral cephalometric radiograph; the craniometric point zygomaxillare.

labrale inferior Most forward point of the lower lip.

labrale superior Most forward point of the upper lip.

menton The most inferior point on the chin in the lateral view. A cephalometric landmark.

NA nasion The intersection of the internasal and frontonasal sutures in the midsagittal plane.

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CBCT Abbreviation for Cone Beam Computed Tomography.

OR orbitale The lowest point on the inferior orbital margin.

POG pogonion The most anterior point on the contour of the bony chin in the midsagittal plane.

PO porion The superior surface of the external auditory meatus. In craniometry it is identified as the margin of the bony canal on the skull. In cephalometrics it may be identified from the earpost of the cephalostat (machine porion) or from bony landmarks on the film (anatomical porion).

PNS posterior nasal spine The most posterior point on the bony hard palate in the midsagittal plane; the meeting point between the inferior and the superior surfaces of the bony hard palate (nasal floor) at its posterior aspect.

pronasale Most forward point of the tip of the nose.

prosthion The lowest and most forward point of the alveolar process between the maxillary central incisors.

R point (Broadbent) A cephalometric reference point for registration of superimposed tracings.

S sella turcica The geometric center of the pituitary fossa (sella turcica), determined by inspection – a constructed point in the mid-sagittal plane.

stomion Intersection of the closed upper and lower lips.

subnasale The intersection of the columella of the nose and the upper lip.

Xi point (Ricketts) A constructed landmark on the center of the ramus of the mandible.

cephalometric radiograph A standardized radiograph of the head characterized by a precisely defined relationship among x-ray source, subject and film. By convention, the distance between x-ray source and the 'center' of the subject (midsagittal plane or transporionic axis) is either 5 feet (152.4 cm.) or 150 cm. The distance between the midsagittal plane or transporionic axis of the subject and film is approximately 12 cm, but may be standardized at a different value or varied according to head size and recorded for each exposure. The standard projections are lateral (profile) and posteroanterior (P-A).

cephalometric tracing A fine line tracing on an acetate film overlay of salient cephalometric structures, landmarks and pertinent measurements, which is used for diagnostic purposes.

ceramic brackets Crystalline alumina tooth-shade or clear synthetic sapphire brackets that are esthetically more attractive than conventional metal attachments.

cervical anchorage See anchorage.

cervical appliance Primarily an extraoral appliance that, when activated, delivers responsive force, by means of a pad, placed on the back of the neck.

chin cap A component of an extraoral orthopedic appliance capable of delivering superiorly and posteriorly directed force to the chin.

cleft lip A unilateral or bilateral congenital fissure in the upper lip, usually lateral to the midline. The defect can extend into the nares and may involve the alveolar process. It is caused by a defect in the fusion of the maxillary and nasal processes and may be accompanied by cleft palate.

cleft palate A unilateral or bilateral congenital fissure in the palate. It is caused by a failure of the premaxilla and lateral palatine process to fuse and may be accompanied by a cleft lip.

clenching Nocturnal parafunctional activity of temporalis, masseter and pterygoid muscles that is considered to be part of a stress-strain-tension release syndrome, frequently associated with bruxism and temporomandibular joint disturbances.

clicking A term applied to abnormal soft tissue sounds (usually audible or by stethoscope or on palpation) emanating from one or both temporomandibular joints during jaw movement.

closed bite Excessive vertical overlap of the anterior teeth; deep bite.

closing loop An “auxiliary” incorporated into an archwire that, upon mesiodistal-pulling activation (which opens the loop), moves adjacent teeth together.

cold working The process of changing the form or cross-section of a piece of metal at a temperature below the softening or recrystallization point, but commonly at or about room temperature. It includes rolling, drawing, pressing and stretching.

College of Diplomates of the American Board of Orthodontics (CDABO) An organization of orthodontists who are board-certified by the American Board of Orthodontics. Any board-certified orthodontist is eligible to become a member of the CDABO. The purpose of the CDABO is to support, encourage and facilitate the process of board certification for all orthodontists. The CDABO also sponsors cutting edge, family-oriented, continuing education meetings for its members.

comprehensive orthodontics A coordinated diagnosis and treatment leading to the improvement of a patient's

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craniofacial dysfunction and/or dentofacial deformity which may include anatomical, functional and/or esthetic relationships. Treatment may utilize fixed and/or removable orthodontic appliances and may also include functional and/or orthopedic appliances in growing and non-growing patients. Adjunctive procedures to facilitate care may be required. Comprehensive orthodontics may incorporate treatment phases focusing on specific objectives at various stages of dentofacial development.

compressive deformation The shortening of a dimension of a “body” due to a pushing force.

computer-assisted tomography (CATscan) The presentation of anatomical information from a cross-sectional plane of the body by computer synthesis of an image from x-rays. Transmission data is obtained in many different directions through the plane under consideration.

computerized cephalometrics The process of entering cephalometric data in digital format for analysis by any one or more of a variety of analyses available in software format.

computerized digital imaging Substitution of a radiation detector plate for radiographic film in the film cassette. The detectors store the radiation energy at each pixel as a latent image for release into the computer in digital format. Advantages include a radiograph with a much wider dynamic range for improved edge enhancement, and the ability to change contrast in specific regions.

condyle The rounded cartilage and bone articulating element of the mandible. The superior portion of the ramus that articulates with the temporal eminence in the glenoid fossa.

condylar displacement A functional abnormality in which one or both mandibular condyles are displaced from their normal relationships with their articular discs and eminentia in the glenoid fossae.

condylar guidance 1. Mandibular guidance generated by the condyle and articular disc traversing the contour of the glenoid fossa. 2. The mechanical form located in the upper posterior region of an articulator that controls movements of its mobile member.

condylar growth Proliferation of condylar cartilage, followed by its endochondral ossification. The condyle is a site of growth that is important to the overall development of the mandible. Condylar growth normally stops shortly after that of the rest of the face, although it may continue well beyond adolescence, particularly in males, or it may stop and begin again.

condylion The highest point on the superior outline of the mandibular condyle.

continuous orthodontic force Action of an appliance against the dentition that decreases little in magnitude during the between-appointments period.

corticotomy In bone surgery, a corticotomy is a cutting of the bone that splits it in two but involves cortex only, leaving intact the medullary vessels and periosteum.. Corticotomy is particularly important in distraction osteogenesis and also where RAP (regional acceleratory phenomenon) is used to accelerate tooth movement.

cosmetic orthodontics Orthodontic therapy, the purpose of which is limited to improving the appearance of the teeth or face.

couple A pair of equal and opposite non-collinear forces applied to a body. A couple always results in the creation of a pure moment with a tendency to rotate around the center of resistance.

couple-force ratio The ratio of magnitudes of the crown couple to the crown force, having net units of length (e.g., mm), in the two-dimensional analysis of tooth movement.

coupling Designates the stereotyped sequence of bone resorption- formation within the evolving secondary harvesian systems. It involves the concerted action of the osteoclasts and osteoblasts.

cranial base The inferior part of the skull or the brain case that forms predominantly by endochondral ossification. Because the bones of the cranial base stop growing relatively early, they are often used as a reference in the superimposition of serial cephalograms or tracings to measure changes due to growth, time and treatment.

craniometry The direct measurement of dry skulls; an anthropometric technique that forms the basis of cephalometric radiography.

crepitus A grating or grinding sound in a moving joint or fracture.

crib A type of wrought-wire clasp that surrounds or encloses a tooth; occasionally, used to describe an interceptive fixed transpalatal tongue and/or finger appliance.

crossbite An abnormal relationship of a tooth or teeth to the opposing teeth, in which normal buccolingual or labiolingual relationships are reversed. Also called Reverse articulation.

crowding Dental malalignment caused by inadequate space for the teeth.

Crozat appliance A wrought-wire removable orthodontic appliance introduced by George Crozat.

curve of Spee [Ferdinand Graf von Spee (1855-1937)] The anatomic curve established by the occlusal and incisal surfaces of the tooth crowns, as projected into the median plane in either dental arch. This curve is generally concave upward in the mandibular arch and convex for the maxillary arch. Also called Anteroposterior curve.

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curve of Wilson (George H. Wilson 1855-1922) Because the long axes of the mandibular molars and premolars converge towards the midline, the occlusal surfaces of these teeth, bilaterally, form a curve in a buccolingual direction. This imaginary curve which is defined by a line tangent to the buccal and lingual cusps of the mandibular posterior teeth bilaterally, is termed the curve of Wilson. Also called Mediolateral curve.

cyst A sac (normal or abnormal) in bone or soft tissue, usually lined by epithelium and containing a liquid or semisolid material.

- D -

debanding The removal of cemented orthodontic bands.

debonding The removal of bonded orthodontic attachments.

decompensation Orthodontic tooth movement that is done to bring teeth into optimum position in their respective jaws in preparation for orthognathic surgery.

DDS or **DMD** Doctor of Dental Surgery or Doctor of Dental Medicine, two equivalent degrees awarded by dental schools to graduates of the doctoral dental program.

deep bite Excessive overbite; closed bite.

deformation Any change in the geometry (size and/or shape) of a body produced by the application of force.

dehiscence A fissural defect in the facial alveolar plate extending from the free margin apically.

dental plaque A “conglomeration” of bacteria and organic matter which adheres to the teeth and related structures.

dentin The hard tissue of the tooth surrounding the central core of nerves and blood vessels (pulp). It forms the bulk of a tooth and is covered by enamel on the coronal part and cementum on the radicular portion of the tooth.

dentition

primary dentition Teeth that develop and erupt first in order of time and are normally shed and replaced by permanent (succedaneous) teeth.

transitional dentition A phase in the change from primary to permanent dentition, in which the primary molars and canines are in the process of exfoliating and the permanent successors are emerging.

adolescent dentition The dentition that is present after the normal loss of primary teeth and prior to cessation of growth that could affect orthodontic treatment.

adult dentition The dentition that is present after the cessation of growth that could affect orthodontic treatment.

dentofacial deformity Malformation of the dental and/or facial structures characterized by disharmonies of size, form and function, malocclusion, cleft lip and palate and other skeletal or soft-tissue deformities, including various types of muscular dysfunction.

dentofacial orthopedics A synonym for orthodontics that more fully describes the scope of contemporary practice. See orthodontic.

developmental guidance See guidance.

diagnostic set up A laboratory procedure in which teeth are removed from the plaster cast and repositioned in wax. It may be used as a diagnostic tool to evaluate alternative treatment plans, particularly in interdisciplinary treatment, when a tooth size discrepancy exists or when orthognathic surgery is required along with orthodontic treatment.

diarthoses Another term for synovial joints.

diastema A space between two adjascent teeth in the same dental arch.

differential moment The application of different moments to adjacent teeth that create different tendencies to rotate with different equilibrium forces present.

digital image A rectangular array of numbers representing the gray scale of a radiograph or color shades of a color image.

digitization Conversion of any landmark of interest to numerical values on a two or three-dimensional coordinate system. The process allows for automatic measurement of landmark relationships and reduces the human error to landmark identification.

Diplomate A dental specialist who has achieved certification by the recognized certification board in that specialty, as attested by a certificate from the Board. See American Board of Orthodontics.

direct reimbursement A self-funded program in which the individual is reimbursed, based on a percentage of the cost of dental care. Allows beneficiaries to seek treatment from the dentist of their choice.

disclusion Separation of opposing occlusal surfaces as the mandible moves into different functional positions.

discrepancy A disparity in the ratio of tooth size to arch length.

displacement A movement from the usual place or position.

distal A direction oriented along the dental arch away from the dental midline; right or left in the anterior segment posteriorly in the buccal segments.

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distal segment Synonymous with posterior segment.

distoclusion Mandibular teeth occlude posterior to their normal relationship to the maxillary teeth, as in an Angle Class II malocclusion.

distoversion A term sometimes used to describe a tooth positioned distal (posterior) to its normal position.

distraction osteogenesis A surgical technique used for lengthening of bones for the correction of skeletal deformities; in the craniofacial area it is used for the treatment of hypoplasias of the maxilla or the mandible.

DHMO (dental health maintenance organization) A legal entity that accepts responsibility and financial risk for providing specific services to a defined population during a defined period of time at a fixed cost. An organized system of healthcare delivery that provides comprehensive care to enrollees through designated providers. Enrollees are generally assessed a monthly payment for healthcare services and may be required to remain in the program for a specified amount of time. See HMO.

dolichocephalic Long, narrow cranial form (cephalic index 75.9 or less); the opposite of brachycephalic.

dolichofacial A facial pattern characterized by a long, narrow face; preferred term is leptoprosopic.

down-fracture In orthognathic surgery, a procedure in which all or part of the maxillary alveolar or basal bone is separated and/or broken away from the more superior elements of the midfacial skeleton. See Le Fort 1.

Downs analysis A group of ten lateral cephalometric measurements developed by William B. Downs for the purpose of evaluating dentofacial relationships.

drift See mesial drift.

dysfunction Partially impaired or abnormal function.

dysplasia Abnormality in development.

- E -

early orthodontic treatment Orthodontic treatment started while the patient is still in the transitional or primary dentition.

EARR Abbreviation for External Apical Root Resorption.

ectopic Located away from normal position; often used to describe a condition in which a tooth develops or erupts in an abnormal position.

edge-to-edge occlusion An occlusion in which the anterior or posterior teeth of both jaws meet along their incisal or buccal cuspal edges. Often associated with a Class III molar relationship.

edgewise appliance A fixed orthodontic appliance characterized by attachment brackets that have a rectangular slot for engagement of a rectangular orthodontic wire.

elastic descriptive of material behavior such that, upon unloading from a deformed state, recovery is totally to the configuration prior to loading (adjective). A flexible appliance auxiliary, that exhibits substantial force.

elastics (rubber bands) Variously used as Class II elastics, Class III elastics, Diagonal elastics, Up-down (vertical) elastics and cross-elastics. Usually made of latex.

elastic deformation A deformation not sufficiently severe to take the most strained element of a body beyond the elastic limit of the material.

elastic limit The limit of load, stress, deformation, or strain beyond which the loaded (activated) body will exhibit permanent deformation (a new passive shape) upon complete unloading (deactivation).

elastic range The deformation or strain coordinate of the elastic limit.

elastic strength The load or stress coordinate of the elastic limit.

elastomeric ligature A polymeric or rubber band or thread that is stretched around the tie-wings of an orthodontic bracket for the purpose of preventing disengagement of an archwire or auxiliary from the bracket-slot.

electrosurgery The application of a high-frequency electric current to tissue as a means to remove lesions, arrest bleeding, or cut tissue. Electrosurgery can be used to cut, coagulate, desiccate or fulgrate tissue.

embrasure 1. the space formed when adjacent surfaces flair away from one another. 2. in dentistry, it is the space that is formed around the adjoining contact of two teeth.

emergence Coming out of; often used to describe the initial appearance of a tooth as it breaks through the gingival tissue during eruption.

EMG Abbreviation for electromyography.

enamel The hard, thin, translucent layer of calcified tissue that surrounds the dentin in the coronal part of the tooth. It is also the hardest material in the human body.

enameloplasty the reshaping of the enamel, often done as occlusal adjustment.

enucleate A surgical procedure that describes the removal of a complete structure, such as an unerupted tooth or a cyst.

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equilibrate To reshape the occlusal (functional) surfaces of the teeth in order to alter the functional relationship, thereby redistributing and balancing the functional load.

eruption Movement of teeth in an incisal or occlusal direction into the oral cavity through the supporting bone and gingival tissue.

esthetics, facial See facial esthetics.

etch The application of a weak acidic solution to the labial or lingual surfaces of teeth as part of preparation for bonding orthodontic attachments to the teeth.

etchant An agent that is capable of etching the surface.

etiology The cause of a medical or dental condition.

excessive force Force delivered by an orthodontic appliance that is of such magnitude that it may damage supporting tissue or cause anchorage loss.

exfoliate Physiological loss or shedding, as when a primary tooth is lost prior to the eruption of the permanent tooth.

exostosis An overgrowth of bone which results in a bony projection, as a tori or spur.

expansion Enlargement; often used to describe the mechanical widening of the dental arches.

expansion key An instrument used to turn the “jackscrew” in an expansion appliance.

expansion screw A mechanical device incorporated in a removable or a fixed appliance that is used to enlarge the dental arch in some dimension.

expansion, rapid palatal (RPE) See rapid palatal expansion.

extraction Removal of a tooth.

extraction, serial See serial extraction.

extraoral anchorage Anchorage located outside the mouth.

extraoral force or traction A force that originates outside the oral cavity.

extrusion A translational form of tooth displacement with movement occlusally directed and parallel to the long axis of the tooth.

- F -

facebow 1. A long metal bow which is used in conjunction with extraoral traction anchored on the back of the head or neck. The metal bow inserts intraorally into an orthodontic appliance and is generally used to distalise teeth or bones or prevent their forward movement. 2. A caliper-like instrument used to record the spatial relationship of the maxillary arch to some anatomic reference point or points and then transfer this relationship to an articulator; it orients the dental cast in the same relationship to the opening axis of the articulator.

facemask The component of an (primarily) extraoral, reverse-pull or protraction appliance that distributes responsive force across much of the face.

facial Of or relating to the face. Often used to identify the surface of a tooth located nearest the face.

facial asymmetry A term used in the negative sense to describe a reduction of similarity or proportion between the right and left sides of the face or the craniofacial skeleton. May also be applied to any structure that is too large or small so as to be out of balance or not proportional to other structures.

facial concavity A term applied to the analysis of a profile. The shape is described as an inwardly rounded curve from the forehead to the lips to the chin. A concave facial profile is often associated with a Class III malocclusion.

facial convexity A term similar to facial concavity, but describes an outwardly rounded curve from the forehead to the lips to the chin. Facial convexity indicates a fullness in the lip region and is associated with a Class II malocclusion.

facial esthetics A term pertaining to facial beauty, symmetry, balance and proportion.

facial form The configuration, shape or appearance of the face from an anterior frontal view.

facial growth The process of enlargement of the craniofacial skeleton and soft tissues.

facial pattern A term generally used to describe the facial form or the direction and type of facial growth.

facial proportions An assessment of the balance of the face from a frontal or profile view. The intent of the assessment is to determine asymmetry or imbalance.

facial type A classification of the face. Three facial types are described: brachycephalic or euryprosopic (wide, short), dolichocephalic or leptoprosopic (long, narrow), and mesocephalic or mesoprosopic (average).

faciolingual The local direction perpendicular to the mesiodistal direction and parallel to the occlusal plane; the facial direction/sense is away from and the lingual (or palatal) direction/sense is toward the tongue; labial and facial are synonymous in the anterior portion of the dental arch, and buccal is synonymous with facial in the posterior portions of the dental arch.

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fatigue The tendency for a metal to break under conditions of repeated cyclic stressing considerable below the ultimate tensile strength.

fee for service dentistry A method of paying practitioners on a service-by-service basis rather than a salaried or capitated basis.

fenestration A window defect of the gingival tissue or alveolar bone contiguous to the root surface.

fiberotomy A surgical procedure designed to sever the gingival and/or transseptal periodontal fibers around a tooth in an attempt to reduce the tendency for relapse of corrected tooth rotations.

finger spring A configured segment of wire that may be included in an orthodontic appliance or a retainer that, when activated, tips a tooth in a desired direction.

finishing A stage of treatment that is toward the end of comprehensive orthodontic care in which the teeth are placed in their final positions.

first order bends See bends, first order.

first order rotation A tooth as a whole rotates about an occlusogingival axis. The angulation/orientation of the long axis of the tooth does not change.

fixation Immobilization of the facial bones after a surgical procedure by means of wires, screws, plates, elastics, or splints until the healing process is complete.

fixed appliance An orthodontic appliance whose attachments are bonded or cemented to the teeth and cannot be removed by the patient. Generally termed 'braces' by the lay public.

flush terminal plane A developmental stage. The normal and desirable time-linked relationship of the distal surfaces of the maxillary and mandibular second primary molars.

flux A material used when soldering or brazing to remove surface oxides and impurities and to improve wetability.

FMA Cephalometric assessment of the inclination of the lower border of the mandible to the Frankfort plane.

FMIA Common cephalometric assessment of the mandibular incisor inclination with the lower border of the mandible.

force A mechanical action of one body on another that tends to displace and/or deform the body receiving it. Force may be continuous, intermittent, interrupted, intraoral, extraoral, orthodontic, orthopedic, elastic, spring, magnetic, etc. depending on the motivating elements involved.

fossa, glenoid See glenoid fossa.

Fränkel appliance (introduced by Rolf Fränkel) An activator type functional appliance that is intended to stimulate or inhibit jaw growth, retrain muscles or widen the dental arches. It is unique in that it is the only tissue borne functional appliance.

free-way space The clearance or interocclusal distance between the maxillary and mandibular teeth when the mandible is in its postural resting position.

frenectomy The surgical removal or repositioning of a frenum. Performed to enhance the stability of a corrected diastema or to alleviate a “tongue-tie”.

frenum A fold of mucous membrane and underlying fibrous tissue that connect lip, cheek or tongue to the alveolar mucosa. (May be labial or lingual).

friction A resistance to the relative displacement of contacting bodies in a direction tangent to the plane of contact.

frontal cephalometric radiograph A radiograph taken with the x-ray source located behind the head and the x-ray film located in front of the face. More correctly termed a posters-anterior (P-A) cephalometric radiograph. See cephalometric radiograph.

full treatment Comprehensive orthodontic treatment including both maxillary and mandibular dental arches.

functional appliance A term used to describe to a class of appliances which utilize the muscle action of the patient to produce orthodontic or orthopedic forces.

functional jaw orthopedics The form of therapy, usually with activator-type appliances, that utilizes the musculature to create dentofacial changes.

functional matrix A theory, which explains the interrelationship between osteogenesis and local functional demands, proposed by Melvin L. Moss.

functional occlusion An arrangement of the teeth intended to minimize stress on the temporomandibular joint; maximize function, stability and esthetics of the teeth; and provide for protection and health of the periodontium.

- G -

gemination (twinning) Abnormal tooth development due to incomplete division of a single tooth bud.

genial Pertaining to the chin.

genioplasty A surgical procedure designed to reshape the contour of the chin, usually by augmentation or reduction.

gingiva The fibrous investing tissue, covered with epithelium, which immediately surrounds the teeth and is contiguous with the periodontal ligament and with the mucosal tissues of the mouth.

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gingival attachment The fibrous attachment of the gingiva to the tooth/teeth.

gingival crevicular fluid (GCF) The fluid that usually seeps into the sulcular area around the tooth from the crevicular epithelium. The flow of this fluid is increased in the presence of inflammation.

gingival display Measure of exposure of gingival tissue during a smile. See gummy smile.

gingival graft A surgical procedure usually performed to establish an adequate amount of attached gingiva around a tooth or group of teeth.

gingival recession Shift of a gingival margin apically so that part of the root of the tooth is exposed.

gingivitis Inflammation of the gingiva.

glenoid fossa The depression or fossa in the temporal bone in which the condyle of the mandible is positioned; part of the temporomandibular joint (TMJ).

glossectomy Partial or total resection of the tongue.

gnathion The most anterior-inferior point on the chin; a cephalometric landmark in the lateral view.

gnathology The study of the functional and occlusal relationships of the teeth as they relate to the TMJ; sometimes also used to identify a specific philosophy of occlusal function and treatment or articulator simulation of these movements.

golden proportion The ratio between succeeding terms in a mathematical progression (Fibonacci series) in which each number is the sum of the preceeding two numbers (1, 1, 2, 3, 5, 8, 13, 21, ……..). The ratio converges approximately on 1.618 to 1. It is suggested that such a ratio exists in the natural dentition, the balanced faces, skeletal structures and thus used in orthodontics.

gonial angle The most postero-inferior point on the angle of the mandible. It is located where the mandibular body and ramus join in the region of the attachment of the masseter muscle. (Gonion).

graft A portion of tissue used for implantation.

grinding Usually a term synonymous with bruxism or parafunctional activity.

group function Multiple simultaneous contacts of several maxillary and mandibular teeth on the working side in lateral movements of the jaw during which forces are distributed on a number of teeth.

growth An increase in size.

growth forecast (or prediction) A predicted estimation of change in the location or size of the bones of the craniofacial skeleton due to expected growth and development and/or the effects of treatment.

growth potential An estimation of the amount of growth yet to occur.

growth site An area where growth occurs.

growth spurt An increase in the rate of growth (velocity) during adolescence. It usually occurs at 10-12 in the female and 12-14 in males coincident with the events of puberty.

guard, mouth See mouth guard.

guidance, condylar See condylar guidance.

guidance, developmental A planned orthodontic and orthopedic effort to influence the growth of the jaws and eruption of the teeth, with the objective of guiding abnormal development into a normal situation. This generally requires a combination of carefully timed appliance therapies and supervisory examinations involving radiographic and other diagnostic records at various stages of development. This may be required from the earliest date of detection of a developing malformation until the craniofacial skeleton is mature.

guide plane A fixed or removable orthodontic appliance designed to deflect the functional path of the mandible and alter positions of specific teeth.

guided tissue regeneration (GTR) A procedure that attempts to regenerate lost periodontal tissues or alveolar bone through differential tissue response.

gummy smile A popular term for excessive exposure of maxillary gingival tissue during a full smile.

- H -

habit In dentistry, a term applied to frequently repeated negative activity such as finger or lip sucking or tongue thrusting. Such activity may alter the normal development of the teeth or bones.

habit therapy Treatment designed to prevent potentially deforming finger, lip or tongue habits and/or correct a malformation of the teeth or bones caused by a habit. Treatment might occur with counseling or with appliance therapy or both.

habitual occlusion The usual intercuspation position of the teeth which may or may not coincide with centric occlusion or centric relation.

hand-wrist x-ray An x-ray of the carpal, metacarpal and phalangeal bones of the hand and wrist which can be used to evaluate the progress of the individual toward maturity (bone age or developmental age or skeletal age).

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hardness The resistance of metal to plastic deformation by indentation. The most common method of measurement is Rockwell. Other methods are Brinell, Tukon and Vickers.

hardness number The number used to designate the hardness of metal. The number is related to the scale of values of a particular hardness test, as Rockwell B 80 or Brinell 150.

Hawley appliance A Hawley retainer modified to allow for minor corrective procedures.

Hawley retainer A passive removable acrylic and wire appliance, generally used to stabilize teeth in their new position after orthodontic correction. See retainer.

headcap The component of an (primarily) extraoral appliance that distributes and transfers responsive force to the cranium.

headfilm A common term for a cephalometric radiograph.

headgear Common generic term for an extraoral traction appliance that can be used for growth modification, tooth movement and anchorage.

Health Maintenance Organization (HMO) A legal entity that accepts responsibility and financial risk for providing specific services to a defined population during a defined period of time at a fixed price. An organized system of healthcare delivery that provides comprehensive care to enrollees through designated providers. Enrollees are generally assessed a monthly payment for healthcare services and may be required to remain in the program for a specified amount of time. See DHMO.

helix A spiral bend placed in an orthodontic archwire in the shape of a closed circle.

hemisection The procedure of sectioning a multirooted tooth, most commonly the mandibular molar.

Herbst appliance Fixed or removable appliance designed to effect an orthopedic change of the mandible much like an activator. The appliance obliges the jaw to function in an anterior position to stimulate sagittal correction of Class II malocclusions. It is named for Emil Herbst.

high angle malocclusion A general term applied to a craniofacial pattern in which growth is more vertical than normal; more specifically, a patient with an unfavorable steep angle of the lower border of the mandible. See hyperdivergent.

high-pull headgear A (primarily) extraoral appliance that transmits force to a facebow, J-hooks, or chin cap so that, from a sagittal perspective, the cited force includes a superiorly directed component.

HMO See Health Maintenance Organization.

hinge axis The axis of mandibular rotation in the initial opening movement; usually passing through the mandibular condyles; in gnathologic terms, the most retruded position of the condyle in the glenoid fossa from which functional movements initiate. (also called transverse horizontal axis).

holding arch See lingual arch.

Hooke's law The ratio of mechanical stress to mechanical strain is a constant, as in an elastic modulus of material.

hooks Attachments soldered or welded to archwires for the placement of elastics, headgear, or elastic chains.

hypercementosis An excessive deposition of cementum.

hyperdivergent A facial pattern which includes a high angle of the mandible to Frankfurt plane, possibly a prognathic maxilla, a retrognathic mandible, tendency to open bite, lip incompetence and often a long, sloping forehead.

hyperplasia Tissue enlargement through multiplication of cells, often a response to inflammation or drugs.

hypertrophy An increase in tissue bulk due to an increase in size of the tissue elements.

hypodivergent A facial pattern characterized by a low mandibular plane angle, generally favorable horizontal skeletal relationships, maxillary retrusion, deep overbite of the incisor teeth, a prominent chin, a short nose and a straight or concave profile.

hypodontia Congenital absence of one or more teeth.

hypoplasia Incomplete development of a tissue or structure.

hysteresis The lagging or delay in the effect of a system's change. In orthodontics, the term is often used for the load deflection curve of the superelastic wires where there is separation between the loading and unloading curves.

- I -

iatrogenic An unfavorable response induced by a therapeutic effort.

ideal occlusion A theoretical placement of the teeth in the dental arches which maximizes esthetics function, stability and longevity of the dentition and supporting structures.

idiopathic Pain, disease or disorder of unknown causation.

imaging The process of acquiring representations of structures in either two or three dimensions.

imbrication An overlap of incisors and canines due to crowding.

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immobilization To fix in place so that no movement is possible. Usually used in regard to orthognathic surgery.

impaction (tooth) A condition that describes the total or partial lack of eruption of a tooth well after the normal age for eruption.

impaction (surgical) A term usually used to describe orthognathic surgery involving the superior repositioning of the upper jaw. See Le Fort 1.

implant 1. Any object or material, such as an alloplastic substance or other tissue, which is partially or completely inserted or grafted into the body for therapeutic, diagnostic, prosthetic, or experimental purposes. 2. Generally an artificial structure placed into bone which provides for prosthetic replacement of some missing structure. Also used to describe a graft placed in soft tissue.

impression A negative likeness or copy in reverse of the surface of an object; an imprint of the teeth and adjascent structures for use in dentistry/ orthodontics. An impression in orthodontics is typically produced by placing an elastic compound like alginate in a preformed tray, and placing the loaded tray over the teeth until the material stiffens. The impression is removed from the mouth and may be filled with plaster to produce an exact positive reproduction of the teeth or dental arch.

incisal Pertaining to the cutting edge of the anterior teeth.

inclination The angle of the long axis of a tooth from a particular line of reference; the tilt or tip of a tooth.

inclined plane An acrylic ledge or platform which is usually added to a maxillary Hawley retainer and is designed to intrude teeth or to position the lower jaw forward.

index of malocclusion A system of measurement to describe and quantify malocclusion characteristics**.**

indirect bonding A procedure for bonding orthodontic attachments to the teeth. A laboratory process is performed to position the attachments on plaster casts; the prepositioned attachments are then bonded to the teeth utilizing an elastic impression tray as a transfer device.

Individual Practice Association (IPA) A partnership, corporation or other legal entity which contracts with an HMO, union or other provider to provide care to an enrolled group for a fixed monthly amount. In the IPA, the provider can work from his office instead of an HMO center or clinic. Fee-for-service patients can be treated alongside those in the IPA plan. Patients in the IPA plan must use a participating provider. The provider must follow IPA practices, accept reimbursement as full payment and comply with IPA peer review and quality assurance procedures. Typically, the IPA pays the provider a percentage of his fee, with the remaining percentage held in a reserve pool that may be divided at year's end by the provider if any funds remain.

inelastic deformation Deformation of a member sufficiently substantial to exceed the elastic limit of the material and, upon total unloading (deactivation), the result is in a 'permanent set' (a change in geometry/shape from the passive state prior to the deformation).

infection control Measures practiced by healthcare personnel in healthcare facilities to decrease transmission and acquisition of infectious agents (e.g., proper hand hygiene, scrupulous work practices, use of personal protective equipment (PPE) [masks or respirators, gloves, gowns, and eye protection]. These guidelines are set by CDC, OSHA, etc.

informed consent An agreement by the patient or parent to proceed with or decline treatment after the benefit and risks of treatment options have been presented.

infradentale The highest and most forward point of the alveolar process between the mandibular central incisors.

infraocclusion A tooth or teeth positioned below the normal plane of occlusion.

intensifying screen A stiff sheet of plastic impregnated with a material which fluoresces when exposed to x-radiation. It is used in an x-ray cassette to intensify the x-ray image and reduce the patient's exposure to radiation. See rare earth screen.

interceptive orthodontics An extension of preventive orthodontics that may include localized tooth movement. Such treatment may occur in the primary or transitional dentition and may include such procedures as required for the redirection of ectopically erupting teeth, correction of dental crossbites or recovery of space loss where overall space is inadequate. When initiated during the incipient stages of a developing problem interceptive orthodontics may reduce the severity of the malformation and mitigate its cause. Complicating factors such as skeletal disharmonies, overall space deficiency, or other conditions may require subsequent comprehensive therapy.

interdental spacing Spacing between the teeth.

interdigitation Intercuspation.

interleukins (IL) A group of proteins that function as cytokines and are regulatory of immune function. These proteins are produced as metabolites of arachidonic acid.

intermaxillary Between the upper and lower jaws.

intermaxillary anchorage (Baker's anchorage) Anchorage in which units in one jaw are used to effect tooth movement or to apply traction on the other dental arch.

intermaxillary elastic traction Use of elastics to apply traction between the upper and lower jaws.

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intermittent force An orthodontic or orthopedic force that is inactive for intervals of time during the between-appointments period, often exhibiting a cyclic, long-term, magnitude-time pattern (e.g., force exerted by an extraoral appliance worn only at night).

internal derangement An intracapsular problem of the TMJ which may relate to arthritis, fibrosis, tumors, condylolysis, condylar hyperplasia or other internal factors. This condition often reflects a displacement or malrelation of the articular disk to the condyle and articular eminence.

interocclusal clearance Synonymous with freeway space.

intramaxillary Within one dental arch.

intramaxillary anchorage A situation where a tooth or group of teeth provides anchorage to apply traction to other teeth within the same arch.

intraoral anchorage Anchorage located inside the mouth.

intraoral force Force which is generated by orthodontic appliances in the oral cavity.

intrusion A translational form of tooth movement directed apically and parallel to the long axis of a tooth.

irregularity index An assessment of the crowding of the anterior teeth developed by R. Little.

- J -

J-hook headgear An extraoral appliance (headgear) that uses a pair of metallic hooks, each in the shape of the letter 'j,' which, when attached to a tooth or to an archwire, delivers a force bilaterally to anterior, intraoral sites.

jackscrew Synonymous with expansion screw.

jaw A common term for either the maxilla (upper jaw) or mandible (lower jaw).

jaw relationship The position of the upper jaw in relationship to the lower jaw; usually an anteroposterior or transverse assessment.

joint symptoms A generalized term that refers to various aspects of TMJ dysfunction, internal derangement or other conditions involving the TMJ.

jumping the bite A “slang” term - The correction of a crossbite brought about by horizontal movements of teeth and, occasionally, the jaw, to their correct position.

jumper A spring appliance that is attached to fixed appliances to move teeth (similar to a Herbst appliance and developed by J. J. Jasper.)

- K -

key ridge The most inferior point on the zygomatic process of the maxilla as seen in a lateral cephalometric radiograph; the craniometric point zygomaxillare.

Kloehn headgear See Headgear.

- L -

Le Fort III surgical procedure A craniofacial dysjunction fracture in which the entire maxilla and one or more facial bones are completely separated from the cranial base. Also called Transverse facial fracture.

leveling A phase of comprehensive orthodontic treatment when fixed appliances are used to change the line of intercuspation from a curve to a straight line; to align the teeth in the same plane.

leveling wire Orthodontic wire, sometimes round (in cross-section) and that exhibits low flexural stiffness, used in the leveling phase of treatment.

ligament, periodontal See periodontal ligament.

ligation The act of tying, of applying a ligature. In orthodontics the term is often used to denote tying a wire to the orthodontic brackets.

ligature A tie that secures the archwire in the bracket-slot typically annealed wire, rubber, or a polymer.

light-wire technique An orthodontic treatment modality in which the appliance components to be activated are relatively flexible. Small force values, active over long time periods are used.

limited orthodontic treatment Typically focuses on limited objectives, not necessarily involving the entire dentition. It may be directed at the only existing problem, or at only one aspect of a larger problem in which a decision is made to defer or forego a more comprehensive plan of therapy.

lingual Of or pertaining to the tongue. A term used to describe surfaces and directions toward the tongue.

lingual appliances Orthodontic appliances fixed to the lingual (toward the tongue) surface of the teeth.

lingual arch A single orthodontic wire, that traverses the lingual surfaces of the teeth, usually from molar to molar. Generally used for stabilization, as a holding arch for space maintenance, for expansion, or to provide anchorage for intermaxillary traction.

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lingual frenum See frenum.

lingual retainers A variation of the lingual arch that traverses the lingual surfaces of the mandibular anterior teeth between the cuspids. The purpose is to stabilize the teeth.

lingual root (labial crown) torque The third-order couple of a transverse force system applied to the crown(s) of a tooth or dental segment that has the potential for rotational displacement which results in lingual movement of the root (s) and/or labial movement of the crown(s).

lingual version Denotes malposition of one or more teeth to the lingual; same as linguoclusion.

linguoclusion An occlusal relationship in which the position of one or more teeth is abnormally lingual. Affected teeth must be identified when this term is used.

lip bumper An appliance designed to eliminate excessive lip pressure on the anterior teeth and transfer that force to the molars. Typically consists of a labial archwire with or without an anterior plastic pad, fitted into tubes on the molars. The treatment objectives are to allow incisors to move forward and to distalize the molars, thereby increasing the arch length.

lip incompetence A gap between the relaxed upper and lower lips because of a vertical hard and soft tissue imbalance.

long-face syndrome A craniofacial pattern characterized by a long and narrow face, an increased mandibular plane angle, an anterior open bite malocclusion and lip incompetence. It is thought by some to result partly from a lack of adequate airway.

long-axis rotation A nontranslational tooth movement characterized by the coincidence of the long axis and the axis of rotation.

luxation Forceful movement or displacement of an anatomic structure. In dentistry, may describe displacement of the mandibular condyle or the intentional movement of a tooth in its alveolus with tearing of the periodontal fibers; sometimes used in an effort to free an ankylosed tooth.

- M -

macrodontia Teeth that are larger than normal.

magnetic force Repelling and attracting forces created by small rare earth magnets, incorporated in fixed and removable orthodontic appliances to cause changes in tooth position or optimize response in functional magnetic growth guidance appliances.

MRI (Magnetic Resonance Imaging) Creation of images specifically of the TMJ for studies of articular disc position.

mal- Prefix denoting a bad or unfavorable condition. Malalignment, malocclusion, malposition and malrelation are common terms used in describing unfavorable tooth positions.

malocclusion (relationship of teeth in occlusion**)** A deviation in intramaxillary and/or intermaxillary relations of teeth from normal occlusion. Often associated with other dentofacial deformities. See Angle classification.

malar Relating to the cheek or cheekbone. See zygoma.

mandible The lower jaw.

mandibular resection (osteotomy) Surgical removal of a part of the mandible to allow repositioning of the remaining parts.

mandibular osteotomy Surgical sectioning of the mandible into two or more parts to allow repositioning of the resulting components.

mastication The process of chewing food for swallowing and digestion.

materia alba White accumulation or aggregation of microorganisms, desquamated epithelial cells, blood cells and food debris loosely adhered to surfaces of teeth, soft tissues, dental restorations and orthodontic appliances. Less adherent than plaque, but may change into plaque.

maxilla Paired facial bones that form the base for the upper dental arch, floor of the nose and much of the lower border of the orbit and cheek bones.

maxillary Of or pertaining to the upper jaw. May be used to describe teeth, dental restorations, orthodontic appliances or facial structures.

maxillary osteotomy Surgical sectioning and repositioning of maxillary bone structure to alter bone and jaw relationships.

maximum force An orthodontic force having the greatest magnitude within a range of force values that will produce tooth movement at a clinically acceptable rate.

mechanotherapy Orthodontic treatment with mechanical forces, that act on the dentofacial complex.

mediolateral The direction perpendicular to a sagittal plane of the dentofacial complex; the medial direction/sense is toward, and the lateral direction/sense is away from the mid-sagittal plane.

menton The most inferior point on the chin in the lateral view. A cephalometric landmark.

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mesial Toward or facing the midline, following the dental arch. Used to describe surfaces of teeth, as well as direction.

mesial drift A term applied to either a natural developmental phenomenon whereby the posterior teeth continually move slightly forward as the interproximal surfaces wear or where contiguous teeth are missing and there is movement into that space..

mesioclusion An occlusal relationship in which the mandibular teeth are positioned mesially (forward) relative to the maxillary teeth, similar to the relationship in an Angles Class III malocclusion.

mesiodens A supernumerary tooth located in the midline of the maxillary alveolar process. Often unerupted, it may inhibit or otherwise disrupt eruption and the position of the incisor teeth.

mesiodistal The local direction tangent to the ideal arch form and parallel to the occlusal plane; the mesial direction/sense is toward, and the distal direction/sense is away from, the midline of the dentition.

midsagittal plane The imaginary, vertical plane that separates the left and right sides of the dentofacial complex.

miniscrews Small titanium alloy or stainless steel surgical bone screws.

mesognathic Position of jaws forward from their normal position in relation to other facial structures.

microdontia Abnormal smallness of teeth.

microglossia Presence of a small tongue.

micrognathia An abnormally small jaw.

migration (dental) Spontaneous movement of a tooth or teeth after eruption.

mixed dentition The developmental stage during which both primary and permanent teeth are present in the mouth (approximately 6 to 12 years of age).

model (dental) Popular name for a cast of a tooth or teeth, usually in plaster or similar material.

modiolus The area near the corner of the mouth where eight facial muscles converge.

moment A tendency to rotate as a result of the application of a force that is not through the center of resistance of a body. Moments are measured either as 1) the magnitude of a single applied force times the perpendicular distance the force acts away from the center of resistance, or 2) in the case of a couple, the magnitude of one of the forces of the couple times the distance between the forces of the couple.

monobloc A removable activator type orthodontic appliance.

monomer A chemical compound that can undergo polymerization.

mouthguard A removable elastic appliance used to protect the teeth and supporting tissues during contact sports.

movement

- **first order movement** Movement of teeth in a faciolingual or y direction; also known as in- and out- movements.
- **second order movement** Movement of teeth in a mesiodistal, x, direction.
- **third order movement** Movement of teeth in a vertical, z, direction.

MS Master of Science, a degree awarded by a university graduate school, after completion of an advanced dental specialty education program.

MSD Master of Science in Dentistry, a degree awarded by a dental school after completion of an advanced dental education program.

mucoperiosteum Term used to describe the mucous membrane and the periosteum together. This is used in periodontal surgery to denote the total thickness flap.

mucosa The epithelial lining of body cavities opening to the outside. The oral mucosa lines all of the soft tissue surfaces of the mouth.

myalgia Muscle pain.

myofunctional Referring to the role of muscle function in relation to the teeth and jaws.

- N -

nasion A cephalometric landmark on the bony profile at the junction of the frontal and nasal bones**.**

natural head position A standardized orientation that the head assumes when the subject focuses on a point in the distance at eye level. It is used for clinical examination of the face by anthropologists, orthodontists and maxillofacial surgeons.

neutroclusion Normal mesiodistal occlusal relationships of the buccal teeth.

nightguard A removable plastic appliance worn at night to prevent the deleterious effects of nocturnal parafunctional activity (i.e., clenching, bruxism). See mouthguard.

normal occlusion Optimal meeting of upper and lower teeth during function with no malocclusion present (such as, rotations, malpositions or abnormal jaw relationships that are encountered in Class I, Class II and Class III malocclusion categories).

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- O -

obturator A prosthesis used to close an opening. Frequently used to close the defect caused by a cleft palate.

occlusal Pertaining to the chewing surfaces of the posterior teeth. May be used to identify those tooth surfaces, as well as the direction (upward in the lower arch, downward in the upper).

occlusoapical The local direction perpendicular to the occlusal plane; also termed 'occlusogingival.'

occlusal dysfunction A term often used to describe abnormal functional forces and improper contact of maxillary and mandibular teeth. Untoward reaction beyond the teeth and investing tissues is claimed by some dentists, with the possibility of enhancing a multifactorial TMD etiology.

occlusal index A rating or categorizing system that assigns a numeric score or alphanumeric label to an individual's occlusion. There are five types: diagnostic, descriptive-epidemiological, treatment need or priority, treatment outcome, treatment complexity.

occlusal plane The imaginary surface on which upper and lower teeth meet in occlusion. It is actually a compound curved surface, but is commonly approximated by a plane (straight line in the lateral view) based on specific reference points within the dental arches.

occlusion The relationship of the maxillary and mandibular teeth as they are brought into functional contact.

onplant An anchorage fixture integrated to a bony surface beneath the soft tissue

open bite Lack of tooth contact in an occluding position. (also called apertognathia)

oral screen See vestibular screen.

orbitale The most inferior point on the lower border of the left orbit. A craniometric and cephalometric landmark.

ortho- A prefix denoting straight or correct.

orthodontic (orthopedic) Relating to correction of abnormal dental relationships, including facial structures and neuromuscular abnormalities.

orthodontic attachment An element affixed to a tooth crown that transmits force from the archwire or auxiliary to the dentition (e.g., a bracket).

orthodontic displacement Tooth movement achieved through biomechanical remodeling of the periodontal ligament and/or the alveolar bone.

orthodontic force Force generated by the orthodontic appliance that contributes to the correction of a malocclusion.

orthodontics/ dentofacial orthopedics That dental specialty which includes the diagnosis, prevention, interception, guidance and correction of malrelationships of the developing or mature orofacial structures.

orthodontist A dental specialist who has completed an advanced post-doctoral course in orthodontics which is accredited by the American Dental Association.

orthognathic Normal relationships of the jaws.

orthognathic surgery Surgery to alter relationships of teeth and/or supporting bones, usually accomplished in conjunction with orthodontic therapy.

orthopedic Correction of abnormal form or relationship of bone structures. May be accomplished surgically (orthopedic surgery) or by the application of appliances to stimulate changes in the bone structure by natural physiologic response (orthopedic therapy).

osseous Of or pertaining to bone.

ossification The process of replacing connective tissue such as cartilage and mesenchyme with bone.

ostectomy Surgical removal of a bone or part of a bone.

osteitis Inflammation of bone.

osteoblasts Cells that remodel and deposit bone. These cells arise from osteoprogenitor cells that are often located in the perivascular connective tissue.

osteoclasts A multinucleated giant cell of hematopoietic origin that has the role of removing bone.

osteoconduction 3-Dimensional structural scaffold to allow for the ingrowth of capilliaries, perivascular tissue and osteoprogenitor cells of the host into the graft. The scaffold itself is not osteoinductive and therefore cannot initiate bone formation.

osteocytes Mature osteoblasts that are encased in the bony matrix.

osteogenesis Development of bone; formation of bone. See also distraction osteogenesis.

osteoinduction Recruitment of mesenchymal stem cells from the surrounding bed, and their differentiation into osteoblasts. The recruitment and differentiation of cells are modulated by bone morphogenetic proteins. The activity of BMP does not require viable graft cells. It is present not only in autografts, but also in modified allografts.

osteotomy Surgical procedure that involves the cutting of bone.

overbite Vertical overlap of maxillary teeth over mandibular anterior teeth, usually measured perpendicular to the occlusal plane.

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overjet Horizontal projection of maxillary teeth beyond the mandibular anterior teeth, usually measured parallel to the occlusal plane. When not otherwise specified, the term is generally assumed to refer to central incisors and is measured from the labial surface of the mandibular tooth to the lingual surface of the maxillary at the level of the edge of the upper incisor. Unique conditions may sometimes require other measuring techniques.

- P -

palate The bone and soft tissue that "closes" the space encompassed by the maxillary alveolar arch. There is a posterior extension to the pharynx. Forms the roof of the mouth and is connected to the nasal septum and floor of the nose in the midline.

hard palate The anterior part of the palate that is supported by and includes the palatal extensions of the maxillary and palatine bones.

soft palate The part of the palate lying posterior to the hard palate, composed only of soft tissues without underlying bony support.

velum Posterior appendicular portion of the soft palate.

palatal bar Maxillary lingual appliance, usually transpalatal, connected to the first molars and used to maintain width and increase anchorage.

palatal expansion The lateral movement of the maxillae to increase palatal width.

palpation Digital manipulation and assessment of tissue in physical diagnosis.

panoramic radiograph A radiographic tomograph of the jaws, taken with a specialized machine designed to present a panoramic view of the full circumferential length of the jaws on a single film. Also know by several proprietary brand names of machines, most of which include 'pan' as a part of the name. (Also termed panoral or panorex.)

papilla (interdental) The gingival structure that occupies the space between adjoining teeth.

passivation A process by which metals and alloys are made corrosion resistant through surface treatment. This process usually produces a thin and stable oxide layer on the surface that is protective.

periapical Pertaining to the area and tissues around the apex (tip) of the root of a tooth.

perikymata Small transverse ridges on the surface of the enamel where the prisms of enamel overlap.

perimolysis Decalcification of the teeth from exposure to gastric acid in individuals with chronic vomiting.

periodontal ligament The periodontal membrane which serves a ligamentous function in tooth attachment.

periodontal membrane (or ligament) The fibrous tissue that occupies the space between tooth root and alveolar bone. It provides a ligamentous physical attachment of the tooth to the bone and nourishment to the cementum surface of the root and the cells that permit tooth movement.

periodontal pocket A periodontal disease condition characterized by an abnormally enlarged space between tooth and alveolar bone with destruction of the attaching periodontal membrane and invasion by oral epithelium. Often progressive, it results in bone and tooth loss if not arrested by treatment.

periodontics The dental specially concerned with the maintenance of the health and integrity of the periodontal tissues that support the teeth.

periodontium The investing and supporting tissues of the teeth; the periodontal membrane and alveolar process.

periosteum A membrane that lines the outer surface of all bones, except at the joints of long bones.

permanent dentition Those teeth that succeed the primary teeth and the additional permanent molars.

pharynx That part of the respiratory tract extending from the larynx to the nasal cavity; the throat is a part of the pharynx.

pixel The smallest part of a digitized or Digital Image. It is also used in measuring image size and resolution of a digital image.

pogonion The most anterior point on the chin. A cephalometric landmark in the lateral view.

point A The deepest point in the bony concavity in the midline below the anterior nasal spine. It is often called maxillary apical base. This is a landmark on the lateral cephalometric radiograph.

point B The deepest point in the profile curvature of the mandible from pogonion on the chin to infradentale (junction of alveolar bone and the lower incisors). It is often called mandibular apical base. A landmark on the lateral cephalometric film.

porion The superior surface of the external auditory meatus. In craniometry it is identified as the margin of the bony canal on the skull. In cephalometrics it may be identified from the earpost of the cephalostat (machine porion) or from bony landmarks on the film (anatomical porion).

positioner (tooth positioner) A removable elastic orthodontic appliance molded to teeth when their positions have been altered with a 'setup' made by repositioning the teeth from a plaster cast. The material may be rubber or elastomeric plastic. It is typically used to achieve fine adjustments and retain corrected positions during the finishing stages of treatment.

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posterior nasal spine The radiographic image on the lateral cephalogram that denotes the posterior terminus of the palatal plane.

postural rest position The resting position of the mandible in normal posture. See freeway space, rest position.

PPO (Preferred Provider Organization) A formal agreement between a purchaser of a dental benefits program and a defined group of dentists for the delivery of dental services to a specific patient population, as an adjunct to a traditional plan.

preangulated bracket An orthodontic bracket that has its slot inclined to the ordinary mesiodistal direction but permits the generation of second-order action from a passive archwire. See straight-wire.

preventive orthodontic treatment Intended to mitigate the development of a malocclusion. Typical services may include dental restorations, temporary prostheses space maintainers, to replace prematurely lost deciduous teeth and removal of deciduous teeth that fail to shed normally when this might allow their permanent successors to erupt more favorably.

primary dentition See dentition.

proclination Anterior coronal tipping of anterior teeth, as opposed to bodily protrusion, which indicates positional variation.

prognathic A forward relationship of the mandible or maxilla, relative to the craniofacial skeleton.

prognathism See prognathic.

pronasale Most forward point of the tip of the nose.

proportional limit Highest stress at which stress is directly proportional to strain. It is the highest stress at which the curve in a stress-strain diagram is a straight line. Proportional limit is equal to elastic limit for many metals.

prostaglandins (PG) A member of a group of lipid compounds that are derived enzymatically from fatty acids and have important functions in the human body. They play a role in inflammation and pain that occurs during tooth movement.

prosthion The lowest and most forward point of the alveolar process between the maxillary central incisors.

protraction Anterior displacement of the teeth and/or bones of the face.

protrusion The state of being anteriorly positioned.

proximal segment In surgery, that portion of a sectioned mandible that contains the articulating portion.

pulp (dental) The soft tissue occupying the inner (pulp) chamber of a tooth. Consists of specialized loose connective tissue, blood vessels and nerves.

pure rotation A displacement of a body, produced by couple action, characterized by the center of rotation coinciding with the center of resistance.

- Q -

quadhelix A “W” shaped fixed or removable maxillary expansion lingual arch that incorporates four helices. Usually attached to the maxillary first molar teeth.

- R -

R point (registration point) A cephalometric reference point introduced by Broadbent in his original presentation of the cephalometric technique. It is the midpoint on a perpendicular drawn from the center of sella turcica to the Bolton-nasion line.

radiograph A permanent image, typically on film, produced by ionizing radiation. Sometimes called an x-ray after the most common source of image-producing radiation.

radiographic imaging The process of acquiring representations of structures using ionizing radiation.

ramus Paired vertical posterior parts of the mandible that serve as attachment areas for the muscles of mastication and also contain the condyles that articulate with the temporal bones. Plural-rami.

rapid palatal or rapid maxillary expansion (RPE, RME) An orthopedic procedure which uses a fixed or removable appliance to separate the two maxillary bones at the mid-palatine suture.

rare earth screens Intensifying screens that are coated with special compounds to reduce x-ray exposure for cephalometric and panoral films.

reciprocal anchorage The use of equal and opposite equilibrium forces from an appliance to produce desired tooth movement on different teeth.

reference frame A set of two or three intersecting axes, ordinarily mutually perpendicular, used as a basis for location of points and directions of lines, graphically expressing relationships among variables, or undertaking vector analysis, in a plane or in space.

replantation The replacement of a tooth that has been avulsed, usually as the result of an accident.

reproximation (slenderizing) Abrasive elimination of small amounts of enamel from the proximal surfaces of the teeth, in order to reduce combined tooth-width.

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resection Surgical removal of part or all of a structure.

root resection Removal of the apical portion of the root of a tooth, usually to eliminate infection.

resilience The amount of energy transferred by mechanical work to take a body from an initial, passive state to its elastic limit; the area under the load-deformation plot up to the elastic limit.

resorption Physiologic or pathologic removal of hard tissue (bone or root).

rest position The normal resting position of the mandible with teeth apart and muscles relaxed.

resection Surgical removal of part or all of a structure.

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resorption Physiologic or pathologic removal of hard tissue (bone or root).

rest position The normal resting position of the mandible with teeth apart and muscles relaxed.

retainer Any orthodontic appliance, fixed or removable, that is used to maintain the position of the teeth following corrective treatment.

retention The passive treatment period following active orthodontic correction during which retaining appliances may be used.

retraction Pertaining to desired posteriorly directed, orthodontic or orthopedic displacements of teeth or of bones of the face.

retroinclination Lingual (palatal) angulation (inclination) of anterior teeth.

retrognathic A mandible or maxilla that is retruded in its relationship with other facial structures due to a size discrepancy or positional abnormality.

retrusion Teeth or jaws that are posterior to normal position or movement toward the distal.

reverse-pull or protraction headgear An (primarily) extraoral orthodontic or orthopedic appliance designed to deliver force to the dentition that is principally or totally anteriorly directed.

ribbon arch appliance An appliance developed by E.H. Angle prior to the Edgewise appliance which used a rectangular wire in a vertical slot to gain multidirectional control. The bracket was inverted and used by P.R. Begg for his technique.

rigid fixation Stabilization of two bony segments with metal plates or screws to eliminate movement between the parts.

Risk Retention Group (RRG) Formed under the Risk Retention Act of 1986, Risk Retention Groups are corporations or limited liability associations with the purpose of assuming the liability exposure of their members. RRG's are chartered and licensed as insurance companies in a specific state known as the domiciliary state. A risk retention group must contain the phrase "Risk Retention Group" in its official name. See American Association of Orthodontists Insurance Company (a Risk Retention Group).

roentgenogram An image produced on film by roentgenography; radiograph is the preferred term.

roentgenography Production of permanent images through the use of Roentgen rays (x-rays).

root That part of the tooth not covered by enamel. It normally lies within the alveolus where it is attached to the bone by the periodontal membrane (ligament).

root movement The transverse tooth movement characterized by little displacement of the crown and the center of rotation located on the long axis and at or near bracket level.

root resorption Resorption of a part of the root of a tooth. May be either internal (pulpal) or external.

rotation Can occur around any axis. Orthodontic rotation usually refers to motion around the long axis of the tooth.

RRG See Risk Retention Group.

- S -

sagittal split osteotemy A surgical procedure in which the rami of the mandible are split parallel with the sagittal plane to allow repositioning of the mandibular body either anteriorly or posteriorly into a more favorable relationship with the maxilla.

SARPE Acronym for Surgically Assisted Rapid Palatal Expansion. Used interchangeably with SARME.

SARME Acronym for Surgically Assisted Rapid Maxillary Expansion. Used interchangeably with SARPE.

screen (intensifying) See intensifying screen.

second-order clearance The angle through which an engaged archwire may be tipped within the bracket slot, relative to the 'slot-parallel' configuration, before making contact with the occlusogingival slot surfaces.

second-order rotation A tooth as a whole rotates about a faciolingual axis and the angulation/orientation of the long axis of the tooth changes.

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self ligation Specifically used with brackets that have within them the ligation mechanism to hold the wire.

sella-nasion(S-N) A frequently used cephalometric reference line connecting the center of the sella turcica with nasion.

sella turcica (sella; S) The pituitary fossa. The center is used as a cephalometric landmark.

separation An orthodontic procedure for slightly separating teeth to facilitate placing bands.

separator An object/ agent (elastic module, brass wire, spring) used for separating teeth.

serial extraction A program of selective or guided extraction of primary and sometimes permanent teeth over a period of time, with the objective of relieving crowding and facilitating the eruption of remaining teeth into improved positions.

sheath A synonym for a tube used as an orthodontic attachment.

shield See vestibular screen.

sialorrhea Excessive flow of saliva.

sinus Air cavities within the facial bones, lined by mucous membranes similar to those in other parts of the airways.

sleep apnea A temporary suspension of breathing which occurs repeatedly during sleep.

soft palate See palate.

soldering Joining metals by fusion of alloys that have relatively low melting points - most commonly, lead-base or tin-base alloys, which are the soft solders. Hard solders are alloys that have silver, copper or nickel bases. Use of these alloys with melting points higher than 800°F, 427°C is properly called "Brazing".

space maintainer A prosthetic replacement for prematurely lost primary teeth intended to prevent closure of the space before eruption of the permanent successors. Often an urgent necessity in the buccal segment to prevent impaction of the permanent teeth and other complications.

space regainer An appliance that corrects tooth displacement that results from premature loss of one or more primary teeth without timely space maintenance. Effective when the space loss is recent and small. May be accomplished with varying types of corrective appliances. Often most efficiently accomplished as a part of a comprehensive orthodontic treatment plan.

specialist 1. A person with practice limited to diagnosis and treatment of one specific discipline. 2. A healthcare practitioner who devotes attention to a particular class of diseases, patients, etc.

Spee, curve of See curve of Spee.

splint A rigid appliance used to connect and mutually support teeth or bones. A removable form is often used to temporarily relieve occlusal interferences in functional disorders of the temporomandibular joint and related musculature.

spring-back The recovery exhibited by a beam, shaft, wire, or wire loop upon its unloading (deactivation).

stabilizing wire A stiff rectangular archwire that fills the bracket slot and is commonly used to distribute a responsive force system throughout a dental segment.

stiffness The ratio of change in load to accompanying change in deformation of a member fabricated of a Hookean material and activated within its elastic limit; the slope of the load-versus-deformation plot beneath the elastic limit.

stomatognathic system Literally, the mouth-jaw system; the entire complex of structures of the head and neck involved in the functions of mastication, swallowing, respiration and speech.

stomion Intersection of the closed upper and lower lips.

stop A bend or auxiliary attachment placed on or incorporated into a wire to limit its sliding into a tube or into other orthodontic attachments.

straight wire appliance A variation of the edgewise appliance in which brackets are angulated to minimize multiple archwire bends. Brackets and molar tubes have specific orientation in three planes of space.

strain Local unit volumetric or distortional deformation experienced by a nonrigid body or structure subjected to external force.

stress (mechanical) Local intensity of distributed internal force experienced by a body or structure as a response to the application of external force to that body or structure.

stress-relief A heat-treatment process intended to reduce the magnitudes of residual ('locked-in') stresses induced by inelastic deformation.

stripping of teeth Term used for reproximating or slenderizing mesiodistal width of teeth, usually incisors.

subnasale The intersection of the columella of the nose and the upper lip.

subspinale (Downs Point A) The most posterior point in the concavity between the anterior nasal spine and prosthion, i.e., apical base.

subtraction radiography A darkroom technique in radiology which makes important radiographic information easier to see because it subtracts less important information from the image.

succedaneous teeth Those permanent teeth that replace (succeed) the primary teeth which include all the permanent teeth except the permanent molars.

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superelastic Refers to a metallic alloy having a relatively substantial elastic range; within a specific range of temperatures, the elastic portion of the force-deformation relationship for the alloy has two distinct, sequential parts because of a (submicroscopic) metallurgic phase-change that occurs as the force-magnitude is increased; a reversal of the phase-change occurs as the magnitude of force is subsequently decreased toward the passive state.

superimposition A technique of placing two roentgenographic tracings upon each other when registering on structures that remain relatively stable during the time period separating the two images useful to evaluate the changes brought about as a result of a growth and/or treatment.

superoinferior The global direction perpendicular to the transverse plane of the dentofacial complex or the occlusal plane of one dental arch; the superior direction/sense is upward, and the inferior direction/sense is downward.

supernumerary teeth Teeth in excess of the normal number. Often malformed or erupting abnormally.

supracrestal fiberotomy The procedure of severing the insertion of the supracrestal group of gingival fibers from the tooth; used as an aid to retain the correction of rotation.

supramentale (Downs point B) The deepest point on the profile curvature from Pogonion to infradentale (i.e., apical base).

supraocclusion Overeruption of a tooth or teeth beyond the normal level, often as a result of tooth-loss or irregularity in the opposing arch.

surgical fixation Stabilization of two bony segments for purposes of improving healing.

suture In anatomy - a fibrous junction between bones, as in the face and skull.

symphysis (mental) The union in the median plane of the two halves of the mandible.

synchondroses Joints that connect two bony structures by hyaline cartilage. As the skeleton matures, the hyaline cartilage eventually ossifies. Examples are the ends of long bones, where the bone growth is not yet complete. In the craniofacial skeleton the speno-occipital synchondroses is of great importance.

syndrome A group of symptoms and/or deformities that occur together in a recognizable pattern that define a specific disease or condition.

- T -

technique (appliance) A method or procedure based upon the use of certain appliances in specific ways. There are numerous variations and combinations.

telescoping bite Total lingual crossbite of the mandibular arch.

temporary anchorage device (TAD) A device that is temporarily fixed to bone for the purpose of enhancing orthodontic anchorage either by supporting the teeth of the reactive unit or by obviating the need for the reactive unit altogether, and which is subsequently removed after use.

temporomandibular articulation The bony articulation between the mandible and the temporal bones which consists of the right and left temporomandibular joints.

TENS Acronym for Transcutaneous Electrical Nerve Stimulation

TMD Temporomandibular dysfunction.

TMJ (temporomandibular joint) One of the two paired articulations between the temporal bones of the skull and the mandible; the condylar process of the mandible articulates on the eminence of the glenoid fossa of the temporal bone.

therapeutic diagnosis An assessment of the objectives and available methods of treatment in light of conditions existing in the individual patient.

threshold force The minimum magnitude of force needed to produce a desired orthodontic displacement (a theoretical concept).

thumb (or finger) sucking A normal infantile activity that sometimes extends into middle or late childhood. In certain situations, it may produce or exacerbate malocclusion.

tie-back An omega loop, soldered or welded hook on an archwire anterior to the molar tubes which is tied to an attachment distal to it in order to fixate archwires in place.

tinnitus Noise in the ears, such as buzzing, ringing, roaring, clicking; a symptom often reported in TMJ dysfunction problems.

tomograph A radiograph of a selected layer of the body produced while shifting the film and x-ray source in opposite directions around an axis located in the region of interest. This movement blurs outside structures while maintaining sharpness in the region of interest.

tongue crib An appliance used to control undesirable and potentially deforming tongue movements, i.e., a posturing or thrusting of the tongue between the anterior teeth.

tongue thrust Interposition of the tongue between the anterior teeth, especially in the initial stage of swallowing. This action, often combined with a resting position of the tongue between the teeth, can inhibit normal eruption and produce an open bite.

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tonsils Areas of lymphoid tissue on either side of the throat. The term tonsils most commonly refers to the palatine or the faucial tonsils. An infection of the tonsils is called tonsillitis.

tooth positioner See positioner.

tooth size discrepancy Lack of proportional harmony in the width (mesiodistal diameter) of various tooth crowns and the available space in the dental arch, causing relative spacing or crowding in different parts of the dentition.

torque A third order couple that moves the crown in one direction and the root in the opposite direction.

torsiversion A tooth malposition characterized by rotation around the long axis of the root (not related to torque as described above).

torus An exostosis on the palatal midline or low on the lingual alveolar surface of the mandible in the canine-premolar area. (torus palatinus/torus mandibularis)

toughness The maximum amount of energy, referenced to a passive state, transferred to a body in the form of mechanical work, that the body can absorb prior to structural failure (ordinarily by fracture or rupture); the total area under the load-deformation plot.

tracing (cephalometric) An overlay drawing made from a cephalometric radiograph that shows specific structures and landmarks that may provide a basis for a variety of measurements.

traction Pertaining to a force-delivering component of an appliance that is mechanically activated by elastically extending its characteristic length (e.g., as in the stretching of an elastic module or a coiled spring).

transitional dentition See dentition.

translation The movement of a body as a whole such that the displacements of all particles of that body are alike (equal) in magnitude, direction, and sense. The angulation of the long axis must remain unchanged for a tooth movement to be translational. Any movement of a body that is not a translation in a rotation.

transposition Teeth positioned out of their normal position in the dental arch, specifically describes an anomaly where adjacent teeth have switched positions.

transseptal fibers Gingival fibers traversing the septum between teeth that provide a fibrous connection between the teeth.

transverse displacement An orthodontic tooth movement characterized by displacements of points of the tooth at right angles (perpendicular) to the long-axis orientation.

trauma Tissue damage caused by an external force, such as a blow in an accident or abnormal clenching or grinding of the teeth.

trismus Muscle spasm (cramp).

tuberosity The posterior aspect of the maxillary alveolar process.

Tweed triangle A constructed triangle on the lateral cephalogram or tracing which is formed by the mandibular plane, Frankfurt plane and the long axis of the mandibular incisor. Used as a diagnostic aid by C.H. Tweed.

twin block appliance A functional appliance developed by William Clark, with inclined planes on maxillary and mandibular components, to guide the mandible forward.

twin bracket An edgewise bracket formed by two single brackets side by side on one base. (B. Swain)

- U -

ugly duckling stage A stage of dental development during the incisor transition, characterized generally by linguoversion of mandibular lateral incisors, malalignment and flaring of maxillary lateral incisors, and a median diastema between the maxillary central incisors. These aberrations may be self-corrective, but could persist and require treatment. B.H. Broadbent “coined” the term.

underbite An ambiguous non-technical term for negative overjet. (archaic)

undermining resorption A microscopic local condition in which resorption may occur beyond the active area, undermining bone spicules and so leading to their more rapid removal.

unilateral Relating to one side.

universal appliance An orthodontic appliance developed by S.R. Atkinson which combined some of the principles of edgewise and ribbon arch appliances with very light archwires.

uprighting Tipping inclined teeth to a more normal vertical axial inclination.

utility arch Used in the edgewise technique to upright molars and depress anterior teeth similar to a step-down or bypass arch, developed by R. Ricketts.

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- V -

velopharyngeal insufficiency (VPI) Anatomic or functional deficiency in the soft palate or superior pharyngeal constrictor muscle which affects closure of the opening between the mouth and the nose in speech. The result is in a 'nasal' speech quality.

veneer A protective or ornamental facing. Often used as a restoration to alter the shade and shape of the teeth for esthetics.

vertex (anatomy) The most superior point on the top of the skull.

vertical dimension The vertical distance between two selected anatomic or marked points; specifically relates to the vertical relationship of the mandible to the maxilla.

vertical elastic traction Pertaining to forces occlusally directed and delivered through orthodontic attachments to tooth crowns as the result of the (stretching) activation of an 'up-and-down' elastic band.

vestibular screen (oral screen) A removable appliance, used to deflect or eliminate muscle forces on certain teeth. Commonly placed in the vestibule between the lips, cheeks and the teeth.

vestibule The portion of the oral cavity that is bounded on the medial side by the gingiva, alveolar process, teeth and on the lateral side by the lips or cheek.

visceral swallowing The term used to describe the swallowing pattern in which the tongue is thrust between the teeth (i.e., infantile swallowing pattern).

Visual Treatment Objective (VTO) A diagnostic and communication aid that consists of a cephalometric tracing or computerized projection which is modified to show anticipated changes in the course of treatment.

voxel A three-dimensional version of a pixel. Voxels are generated by computer-based imaging systems, such as CT and MRI. Using voxels, three-dimensional simulations of objects can be reconstructed by imaging systems.

vulcanite An obsolete material that was used to fabricate removable appliances. It is a combination of caoutchouc and sulfur. It hardens in the presence of certain heat and pressure.

- W -

w arch W-shaped maxillary expansion arch, usually soldered to the lingual of the maxillary molars. (Also known as Porter arch.)

Waldeyer's ring (Waldeyer's tonsillar ring) Anatomical term that describes the lymphoid tissue ring located in the pharynx.The ring consists of (from superior to inferior) the adenoids, tubal tonsils, palatine tonsils and the lingual tonsils.

wear facet A flat, polished surface on a tooth which is produced by physiologic or parafunctional occlusal contact.

weld A joint between pieces of metal at faces that have been made plastic by heat or pressure.

Wilson, curve of See curve of Wilson.

Wolff's Law Eponym for the principle that a bone, either normal or abnormal, will develop the structure most suited to resist those forces acting on it.

working side The lateral segment of the dentition toward which the mandible is moved during masticatory function.

World Federation of Orthodontists (WFO) An organization of orthodontic specialists formed initially by 69 orthodontic organizations from 62 countries at the 4th International Congress in San Francisco, CA, USA on May 15, 1995. The purpose of the WFO is to advance the art and science of orthodontics throughout the world.

- X -

x-bite Abbreviation for crossbite.

x-ray Electromagnetic radiation produced when electrons strike a target under high voltage in a vacuum. The term is sometimes used incorrectly as a synonym for radiograph.

xerostomia A symptom in which too little saliva is produced in the mouth. Also called 'dry mouth'.

- Y –

yield strength The stress at which a material exhibits a specified deviation from proportionality of stress and strain. An offset of .2% is commonly used.

Youngs modulus (modulus of Elasticity, E) The ratio of stress to corresponding strain below the proportional limit. It is a measure of stiffness.

- Z -

zygoma The bone that articulates with the maxilla to form the lateral wall of the orbit and the cheek bone itself. Its posterior extension, the processus temporalis, articulates with the zygomatic process of the temporal bone, and together they provide major support for the muscles of mastication.

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