

30 Years of Orthodontic Thoughts, Pearls, and ...

Dear members of The Academy for Orthodontic Excellence:

Thank you for attending my presentation in Newport Beach. It was an honor to present for you.

The following pages contain the slides which have citations, as well as those with my tables or lists. I hope that these may help.

Sincerely,
Rob Kazmierski

Robert Kazmierski, D.M.D., M.S. Moorestown, New Jersey USA

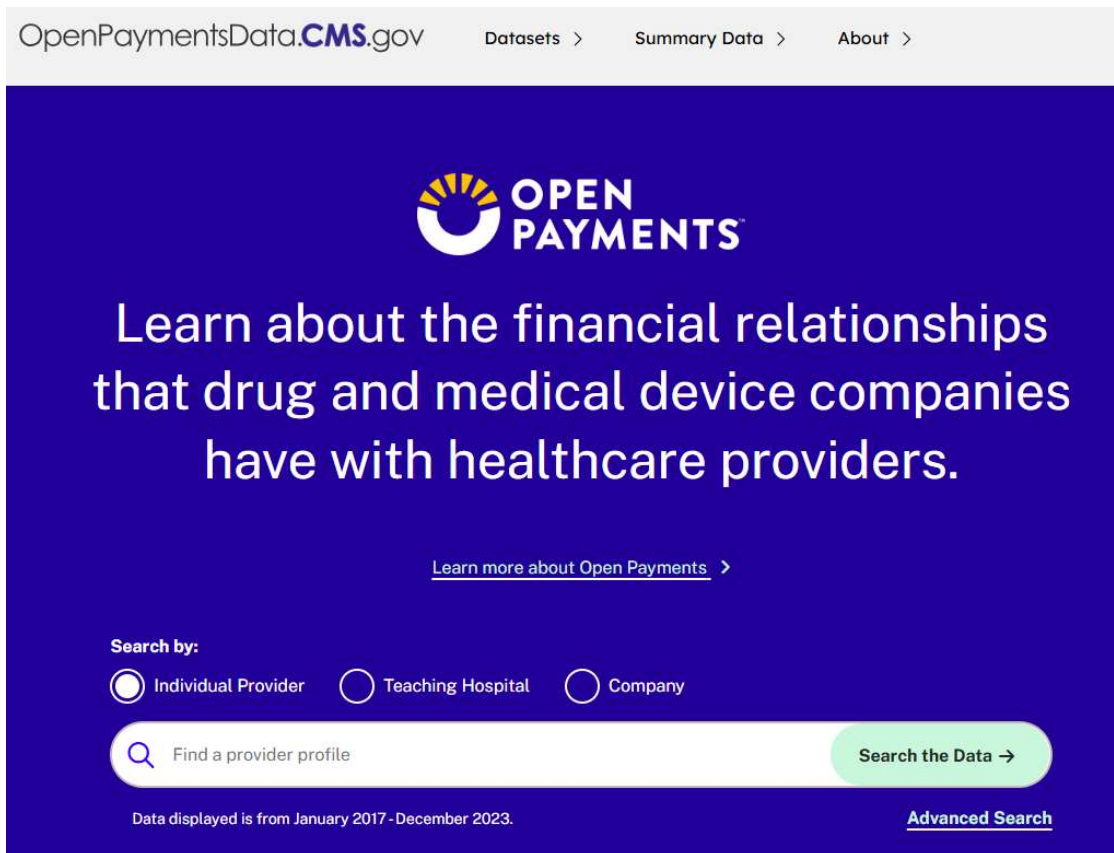
**Presented for:
Academy for Orthodontic Excellence
Thank you to:
Dr. Ron Jawor**



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Discover Financial Bias:

► <https://openpaymentsdata.cms.gov/>



The screenshot shows the homepage of the Open Payments website. At the top, the URL "OpenPaymentsData.CMS.gov" is displayed, followed by navigation links for "Datasets >", "Summary Data >", and "About >". The main content area has a dark blue background with the "OPEN PAYMENTS" logo, which consists of a stylized sun icon and the text "OPEN PAYMENTS". Below the logo, the text reads: "Learn about the financial relationships that drug and medical device companies have with healthcare providers." A link "Learn more about Open Payments >" is positioned below this text. Underneath, there is a "Search by:" section with three radio button options: "Individual Provider", "Teaching Hospital", and "Company". A search input field contains the placeholder text "Find a provider profile" and a magnifying glass icon. To the right of the input field is a green button labeled "Search the Data ->". At the bottom left, it states "Data displayed is from January 2017 - December 2023." At the bottom right, there is a link for "Advanced Search".



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Rhetorical Techniques

The Illusory Effect:

- ❖ The tendency to believe false information to be correct after repeated exposure

The Speaker believing the lie themselves:

- ❖ A result of the speaker repeating the lie

Paltering:

- ❖ Telling many truthful things before delivering a lie

Hasher, Lynn; Goldstein, David; Toppino, Thomas (1977). "Frequency and the conference of referential validity". *Journal of Verbal Learning and Verbal Behavior*. **16** (1): 107–112.

Rogers T, Zeckhauser R, Gino F, Norton MI, Schweitzer ME. Artful paltering: The risks and rewards of using truthful statements to mislead others. *J Pers Soc Psychol*. 2017 Mar;112(3):456-473. doi: 10.1037/pspi0000081. Epub 2016 Dec 12. PMID: 27936834.



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What about TAD anchorage?

- ▶ Gerc RH, meta-analysis, 2013
 - ❖ *TADs help reduce relapse during anterior retraction*



Gerc RH, Janson G, Branco NC, Moura-Gerc PG, Patel MP, Castanha Henriques JF. Intraoral distalizer effects with conventional and skeletal anchorage: a meta-analysis. *Am J Orthod Dentofacial Orthop.* 2013 May;143(5):602-15. doi: 10.1016/j.ajodo.2012.11.024. PMID: 23631962.



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Pendulum vs. Beneslider:

Bulut P, PRCT, 36 Patients, 2024

Beneslider to Miniscrew-supported pendulum appliance:

- ❖ *Failed to provide distalization at the apex*
- ❖ *Caused posterior rotation of the mandible*
- ❖ *Worsened the sagittal and vertical parameters*



Bulut P, Tunçer Nİ. Flexible and rigid guidance in skeletally-anchored maxillary molar distalization: The miniscrew-supported pendulum vs the Beneslider. Am J Orthod Dentofacial Orthop. 2025 Feb 14;S0889-5406(25)00007-1. doi: 10.1016/j.ajodo.2024.11.015. Epub ahead of print. PMID: 39955669.



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Expansion

► Confusion in the definition

Orthopedic	Dental
Expansion (Bony)	Expansion (dental tipping)
Mandibular distraction osteogenesis	Arch Development (dental tipping)
	Dentoalveolar (???)



Classic Hyrax Limits, Early:

- ▶ Kinzinger GSM Et al., 114 patients, 2022
 - ❖ Palatal expansion results in more parallel expansion when done in the mixed dentition.
- ▶ Research does not support expansion before the eruption of the permanent first molars
- ▶ Anchorage off of primary second molars is ideal
- ▶ Age 7, 8

Kinzinger GSM, Lisson JA, Buschhoff C, Hourfar J, Korbmacher-Steiner H. Impact of rapid maxillary expansion on palatal morphology at different dentition stages. Clin Oral Investig. 2022 Jul;26(7):4715-4725. doi: 10.1007/s00784-022-04434-9. Epub 2022 Mar 10. PMID: 35267098; PMCID: PMC9276570.



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Classic Hyrax Limit Late vs. MARPE

Bazargani F, Knode V, Plaksin A , Magnuson A, Ludwig B.

- ▶ Looked at 52 consecutively treated patients
- ▶ Randomly assigned to Tooth Borne (TB) or Tooth and Bone Borne (TBB)
- ▶ The age range was 8 to 13 years, with a mean age of 9.3 for TB and 9.5 for TBB
- ▶ Measurements done with CBCT and plaster models
- ▶ Three time points: Post-expansion, 1 year follow up, 5 years follow up

What did they find?

- ▶ 0.6mm greater expansion of the palatal suture with TBB, which disappeared a year later
- ▶ 0.7 mm greater expansion of the nasal width, which did not disappear 1 year and 5 years later.

Are these differences clinically significant?

Bazargani F, Knode V, Plaksin A, Magnuson A, Ludwig B. Three-dimensional comparison of tooth-borne and tooth-bone-borne RME appliances: a randomized controlled trial with 5-year follow-up. *Eur J Orthod.* 2023 Nov 30;45(6):690-702. doi: 10.1093/ejo/cjad024. PMID: 37253126; PMCID: PMC10687513.



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Leaf Spring Expander:

- ▶ Inchingolo Et al.m
- ▶ Literature Review, 15 studies
- ▶ Compared: Classic Hyrax, Leaf Spring, MARPE
- ▶ Age range 6-16 years
- ▶ Conclusion: The differences in expansion obtained between RME and Leaf expander are not clinically relevant.

Inchingolo AM, Patano A, De Santis M, Del Vecchio G, Ferrante L, Morolla R, Pezzolla C, Sardano R, Dongiovanni L, Inchingolo F, Bordea IR, Palermo A, Inchingolo AD, Dipalma G. Comparison of Different Types of Palatal Expanders: Scoping Review. Children (Basel). 2023 Jul 21;10(7):1258. doi: 10.3390/children10071258. PMID: 37508755; PMCID: PMC10378123.



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Leaf Spring Expander:

- ▶ Mlynarek-Zak, Et al.
- ▶ Finite element analysis
- ▶ Calculated sutural splitting force of 44.2 Newtons at bicuspids
- ▶ 44.2 newtons = 4,508 grams = 9.9 pounds
- ▶ Leaf spring force is 450 or 900 grams

Mlynarek-Żak, Katarzyna & Zmudzki, Jaroslaw. (2019). Distribution of forces on supporting teeth in the midpalatal expander during “Hyrax” screw pre-load. Journal of Achievements in Materials and Manufacturing Engineering. 1-2. 26-31. 10.5604/01.3001.0013.4138.



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Leaf Spring Expander:

- ▶ Zimring and Isaacson
- ▶ In Vivo, 4 patients (age 11.5 to 15.5 years)
- ▶ Force measuring dynamometer
- ▶ Accumulated loads of more than 9 kg
- ▶ 9 kilograms = 9,000 grams = 19.8 pounds
- ▶ Leaf spring force is 450 or 900 grams

ZIMRING JF, ISAACSON RJ. FORCES PRODUCED BY RAPID MAXILLARY EXPANSION. 3. FORCES PRESENT DURING RETENTION. Angle Orthod. 1965 Jul;35:178-86. doi: 10.1043/0003-3219(1965)035<0178:FPBRME>2.0.CO;2. PMID: 14331018.



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Expansion, How long to retain?

- ▶ Costa Et al., 2017
- ▶ Systematic review
- ▶ Retention periods 4 weeks to 16months
- ▶ Conclusion:
 - ❖ Six months of retention with either fixed or removable appliances seem to be enough to avoid relapse or to guarantee minimal changes in a short-term follow-up.

Costa JG, Galindo TM, Mattos CT, Cury-Saramago AA. Retention period after treatment of posterior crossbite with maxillary expansion: a systematic review. Dental Press J Orthod. 2017 Mar-Apr;22(2):35-44. doi: 10.1590/2177-6709.22.2.035-044.oar. PMID: 28658354; PMCID: PMC5484268.



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Expansion, How long to retain?

- ▶ Sarnas, Bjork, Et al. 1992 (Case study, Metallic Implants)
 - ❖ Relapse 10 years later
 - ❖ Expansion 2.3/2.2 ant/post, to 1.0/1.3 ant/post
 - ❖ Concluded: The rationale of RME must be seriously questioned

- ▶ Gurel Et al. (Study Casts)
 - ❖ 41 patients, expander then braces, Average 5 years post treatment follow up
 - ❖ Concluded: A significant amount of relapse occurred in maxillary arch widths at the post retention assessment, the greatest being in inter canine width

Sarnäs KV, Björk A, Rune B. Long-term effect of rapid maxillary expansion studied in one patient with the aid of metallic implants and roentgen stereometry. Eur J Orthod. 1992 Dec;14(6):427-32. doi: 10.1093/ejo/14.6.427. PMID: 1486927.

Gurel HG, Memili B, Erkan M, Sukurica Y. Long-term effects of rapid maxillary expansion followed by fixed appliances. Angle Orthod. 2010 Jan;80(1):5-9. doi: 10.2319/011209-22.1. PMID: 19852633; PMCID: PMC8978752.



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Expansion, How long to retain?

- ▶ Krebs, 1964 (Metallic implants and study models)
- ▶ 23 patients
- ▶ Yearly radiographs
- ▶ Yearly models
- ▶ Followed 7 years

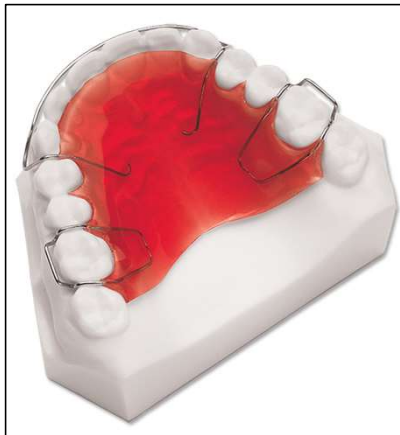
KREBS A. MIDPALATAL SUTURE
EXPANSION STUDIES BY THE IMPLANT
METHOD OVER A SEVEN-YEAR
PERIOD. Rep Congr Eur Orthod Soc.
1964;40:131-42. PMID: 14318002.



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Phase I Exp. Retention Options:

► My progression:



Ashari A, Nik Mustapha NM, Yuen JJX, Saw ZK, Lau MN, Xian L, Syed Mohamed AMF, Megat Abdul Wahab R, Yeoh CK, Deva Tata M, Sinnasamy S. A two-year comparative assessment of retention of arch width increases between modified vacuum-formed and Hawley retainers: a multi-center randomized clinical trial. *Prog Orthod.* 2022 Aug 26;23(1):40. doi: 10.1186/s40510-022-00424-5. PMID: 36018418; PMCID: PMC9415262.



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Materials:



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Expander for TADS: Instructions for Lab:

- ▶ Mount Models to enclosed bite registration
- ▶ Bonded expander with acrylic occlusal coverage of upper 7654 | 4567
- ▶ Please be aware that (Patient name) will be having infra-zygomatic bone plates placed by an oral surgeon, above the 6s. Traction between these bone plates and the appliance will be used to intrude the posterior teeth and close the anterior openbite
- ▶ Please place ball clasps on the occlusal surface of the maxillary teeth with their heads bent and facing towards the occlusal. These will hold the springs attached to the bone plates.
- ▶ Please place these ball clasps so that they lay across the occlusal embrasures between upper 76s, 65s, and 54s.
- ▶ Please do not attach the ball clasps to the main framework (Solder)
- ▶ The further these enter the acrylic towards the occlusal, the better
- ▶ Please allow at least 6mm of clearance between all lingual surfaces of the expander and the palatal tissue. This is to allow room for the intrusion which will occur.

<https://youngdentallab.com/>



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Pre-fabricated arch forms:

All G and H

Arch Form	Width/Shape	Upper/Lower
Bioform III	Narrow, tapered	Lower
Trueform II	Ovoid, most common	Upper
NA III	Moderately broad	Lower
Europa II	Broad, Very	Upper



Wires NiTi:

Abdelrahman Et al., 2015, Angle orthodontist

- ▶ 74 patients
- ▶ Compared :
 - ❖ Superelastic_0.014-inch nickel-titanium NiTi
 - ❖ Thermoelastic_0.014-inch NiTi
 - ❖ Conventional 0.014-inch NiTi)

Conclusion:

- ▶ **There is no significant difference in alignment efficiency or the time required to achieve complete preliminary alignment**

Abdelrahman RSh, Al-Nimri KS, Al Maaitah EF. A clinical comparison of three aligning archwires in terms of alignment efficiency: A prospective clinical trial. Angle Orthod. 2015 May;85(3):434-9. doi: 10.2319/041414-274.1. Epub 2014 Aug 4. PMID: 25090135; PMCID: PMC8612438.



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Advantages of Full-Sized 21x25:

- ▶ Deep bite control is rarely an issue. Rarely a need for reverse curve wires.
- ▶ Maintains incisor torque when used during space closure
- ▶ With MBT or Roth, can be used to setup anterior anchorage to slip posterior anchorage
- ▶ Arch Recovery and torque recovery much faster post extraction
- ▶ Less Root resorption (Personal opinion)

Kaley J, Phillips C. Factors related to root resorption in edgewise practice. Angle Orthod. 1991 Summer;61(2):125-32. doi: 10.1043/0003-3219(1991)061<0125:FRTRRI>2.0.CO;2. PMID: 2064070.

Horiuchi A, Hotokezaka H, Kobayashi K. Correlation between cortical plate proximity and apical root resorption. Am J Orthod Dentofacial Orthop. 1998 Sep;114(3):311-8. doi: 10.1016/s0889-5406(98)70214-8. PMID: 9743137.



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Wire Sequencing:

Wire	Duration
.014 NiTi	6 weeks
.020 NiTi	6 weeks
.21x25 NiTi	6 weeks
.21x25 HT ss	6 weeks
Total	6 months



JCO Article:

LightForce patients had:

- ▶ Fewer finishing procedures involving either bracket repositioning or archwire bends
- ▶ Fewer appointments
- ▶ 30% shorter treatment times
 - ❖ 15-17 months compared to 24 months

Waldman A, Garvan CS, Yang J, Wheeler TT. Clinical efficiency of LightForce 3D-printed custom brackets. J Clin Orthod. 2023 May;57(5):274-282. PMID: 37317538.



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Kevin O'Brien's Blog:

- ▶ No determination of pre-treatment severity or post treatment corrections was made.
 - ❖ Index of Orthodontic Treatment Need (IOTN) measures treatment need, not severity.
 - ❖ No study models used, so PAR or ABO discrepancy index could not be used for severity
- ▶ “... similar to a blood pressure study in which the investigators did not measure the initial or even the final blood pressure. They just concluded that the patients took their tablets for a period of time.”

<https://kevinobrienorthoblog.com/lightforce-makes-claims-using-dodgy-evidence/>



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Kevin O'Brien's Blog:

- ▶ **No author declared a conflict of interest.**
 - ❖ Open Payments shows Dr Walkman received \$82,000 in 2022 and 2023 from LightForce.
 - ❖ Drs Wheeler and Waldman are listed as shareholders in LightForce
- ▶ **Retrospective study**
- ▶ **Inclusion criteria were the availability of pre-treatment photos and the use of fixed appliances.**
- ▶ **JCO is relevant journal for a basic case series report.**

<https://kevinobrienorthoblog.com/lightforce-makes-claims-using-dodgy-evidence/>



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Carrier Research:

- ▶ **McNamara Et al., 23 patients, CBCT, AJODO, 2023**
 - ❖ Class II correction was due to mesialization of L6, distal rotation of U6, “mandibular displacement”
- ▶ **Kevin O’Brien, Blog, 2023**
 - ❖ Changes were “not clinically significant”
 - ❖ Retrospective case series study
 - ❖ No control group was used, for growing patients
 - ❖ Selection bias, all from 1 private office, 6 of 28 (21%) eliminated during the study

Biggs EV, Benavides E, McNamara JA Jr, Cevitanes LHS, Copello F, Lints RR, Lints JP, Ruellas ACO. Three-dimensional Evaluation of the Carriere Motion 3D Appliance in the treatment of Class II malocclusion. Am J Orthod Dentofacial Orthop. 2023 Dec;164(6):824-836. doi: 10.1016/j.ajodo.2023.05.031. Epub 2023 Aug 18. PMID: 37598337.

<https://kevinobrienorthoblog.com/3d-assessment-of-carriere-motion-3d-appliance/>



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Carrier Research, Tip:

- ▶ Lingual tip of lower incisors and distal tip of upper molars?

Schmid-Herman Et al., 2023, 16 patients

Conclusion:

- ▶ “Despite the use of an Essix retainer, we found a protrusion of the mandibular incisors”.
- ▶ “Only a slight distalization of the upper molar”
- ▶ “The main dental effect is distal tipping of the upper molars”

Schmid-Herrmann CU, Delfs J, Mahaini L, Schumacher E, Hirsch C, Koehne T, Kahl-Nieke B. Retrospective investigation of the 3D effects of the Carriere Motion 3D appliance using model and cephalometric superimposition. Clin Oral Investig. 2023 Feb;27(2):631-643. doi: 10.1007/s00784-022-04768-4. Epub 2022 Nov 10. PMID: 36355224; PMCID: PMC9889508.



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Carrier Research, Skeletal:

- ▶ Yin Et al., 2019, Progress in Orthodontics
- ▶ 54 patients, Carrier, Forsus, Elastics
- ▶ “There is no clinically significant skeletal correction induced by Carriere Distalizer”
- ▶ “Carriere Distalizer ... no more effective or efficient than alternatives”
- ▶ “total treatment time may be prolonged due to various side effects.”
- ▶ “it is not effective and efficient to treat Class II malocclusions using Carriere Distalizer.”

Yin K, Han E, Guo J, Yasumura T, Grauer D, Sameshima G. Evaluating the treatment effectiveness and efficiency of Carriere Distalizer: a cephalometric and study model comparison of Class II appliances. Prog Orthod. 2019 Jun 18;20(1):24. doi: 10.1186/s40510-019-0280-2. PMID: 31209589; PMCID: PMC6579799.



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Carrier Research, CBCT:

- ▶ Areepong Et al., 2020, 53 patients, Angle Orthodontist
- ▶ Lower incisor proclination was evident even with the use of an Essix retainer as anchorage in the lower arch.
- ▶ Upper 3s: Distal tipping, distal rotation, extrusion
- ▶ Upper 6s: Distal tipping and rotation
- ▶ Lower 6s: Extrusion and mesial tipping
- ▶ The greater the class II, the greater the lower molar mesial movement

Areepong D, Kim KB, Oliver DR, Ueno H. The Class II Carriere Motion appliance. Angle Orthod. 2020 Jul 1;90(4):491-499. doi: 10.2319/080919-523.1. PMID: 33378493; PMCID: PMC8028468.



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Is Early Cooperation Better?

- ▶ Albino Et al. , 29 patients, Journal of Behavioral Medicine
- ▶ Early in treatment:
 - ❖ Parental attitudes ... best predictors of cooperation.
- ▶ End of active treatment:
 - ❖ Adolescent patients... best predictors of cooperation.
- ▶ Effects of prolonged treatment with phase I Carrier?
- ▶ Non-cooperation alternatives?
- ▶ Recovery as progress to heavy wire, 6 months.

Albino JE, Lawrence SD, Lopes CE, Nash LB, Tedesco LA. Cooperation of adolescents in orthodontic treatment. J Behav Med. 1991 Feb;14(1):53-70. doi: 10.1007/BF00844768. PMID: 2038045.



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Invisalign Class II, Elastics:

Patterson, AJO-DO, 2021

- ▶ Top 1% provider
- ▶ Looked at actual outcomes not predicted
- ▶ 80 Invisalign treated adult patients
- ▶ Class II elastics worn for 7 months
- ▶ Retrospective study

Conclusion

- ▶ No significant Class II correction or overjet reduction was observed with elastics

Patterson BD, Foley PF, Ueno H, Mason SA, Schneider PP, Kim KB. Class II malocclusion correction with Invisalign: Is it possible? Am J Orthod Dentofacial Orthop. 2021 Jan;159(1):e41-e48. doi: 10.1016/j.ajodo.2020.08.016. Epub 2020 Nov 19. PMID: 33223374.



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Invisalign Class II, MA:

Mead, AJO-DO, 2023

- ▶ Invisalign treatment with 16 experienced orthodontists, 195 patients. Actual correction

Found

- ▶ **Mean reduced overjet of 1.88mm**
 - ❖ From $6.496 \pm 2.86\text{mm}$ to $4.616 \pm 2.22\text{mm}$
- ▶ **Mean first molar correction: .9mm**
 - ❖ From $3.146 \pm 1.95\text{ mm}$ to $2.246 \pm 2.51\text{ mm}$
- ▶ **Almost 20% of patients completed treatment with an increased overjet**
- ▶ **47% of the patients had an overjet greater than 4mm at the end**

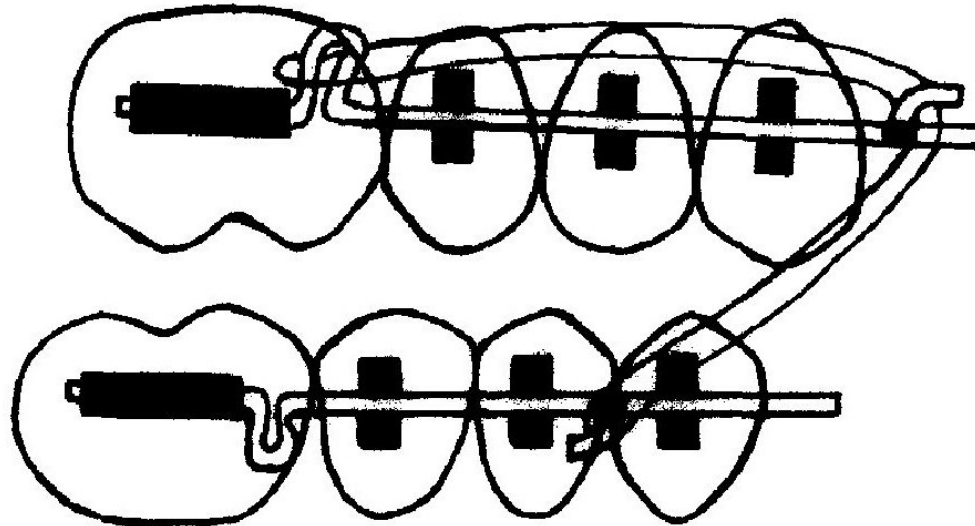
Meade MJ, Weir T. Clinical efficacy of the Invisalign mandibular advancement appliance: A retrospective investigation. Am J Orthod Dentofacial Orthop. 2024 May;165(5):503-512. doi: 10.1016/j.ajodo.2023.11.008. Epub 2024 Jan 16. PMID: 38231167.



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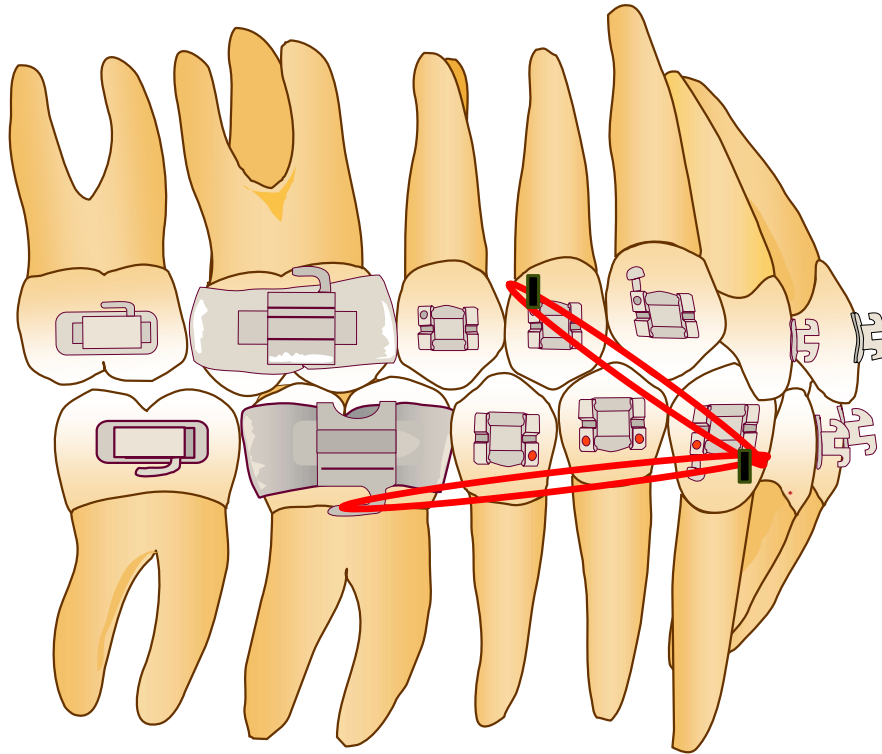
Class II Pearls:

- ▶ Fred Schudy: Short class II elastics



Class II Pearls (Really class III):

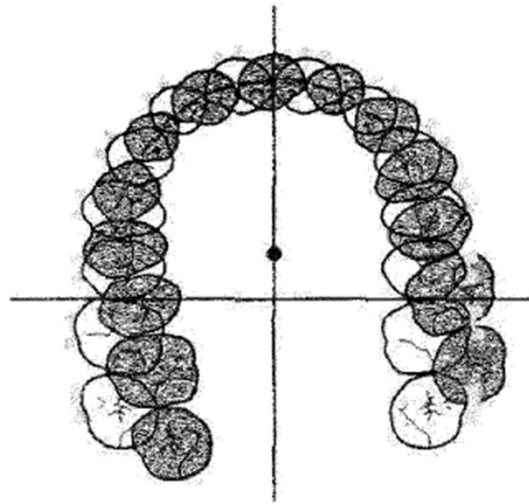
- ▶ Fred Schudy, modification, Short class III elastics
- ▶ Lower 6s to mesial lower 3s to distal upper 4s



Class II Pearls:

- ▶ Charles Burstone Pearl
- ▶ Alternate class II and III elastics rotate the arches skew
- ▶ White Maxilla, Dark Mandible

Right Class III elastics



Left Class II elastics

Figure 20. Crisscross elastics and or combined Class II and Class III elastics can produce rotation of the entire arch, which is not usually desirable.

Burstone CJ. Diagnosis and treatment planning of patients with asymmetries. *Semin Orthod.* 1998 Sep;4(3):153-64. doi: 10.1016/s1073-8746(98)80017-0. PMID: 9807152.



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Ideal at age 7:

- ▶ Risk of orthognathic surgery reduced by 1/3



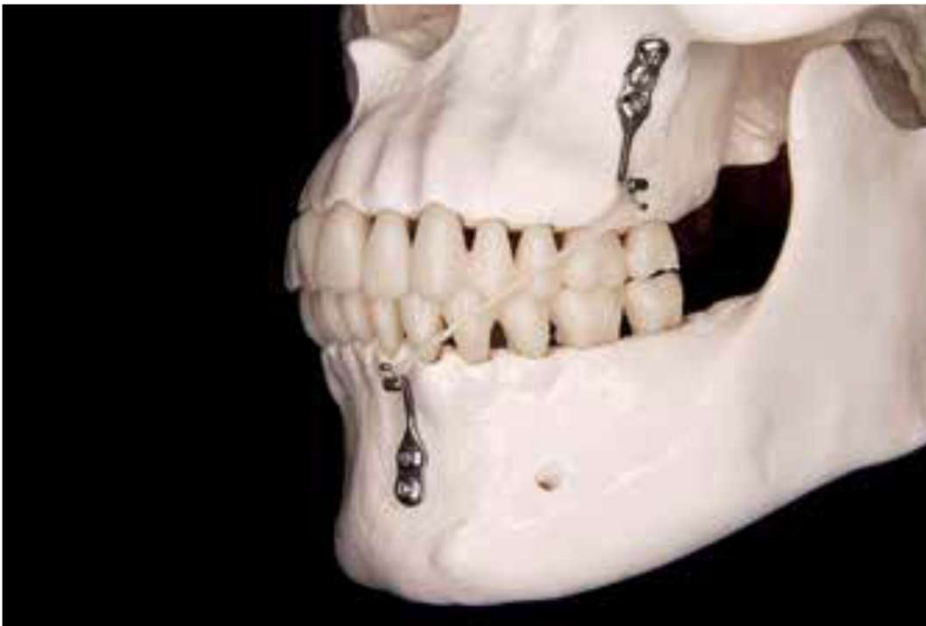
Mandall N, Cousley R, DiBiase A, Dyer F, Littlewood S, Mattick R, Nute SJ, Doherty B, Stivaros N, McDowall R, Shargill I, Worthington HV. Early class III protraction facemask treatment reduces the need for orthognathic surgery: a multi-centre, two-arm parallel randomized, controlled trial. *J Orthod.* 2016 Sep;43(3):164-75. doi: 10.1080/14653125.2016.1201302. PMID: 27564126; PMCID: PMC5062052.



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Bollard Mini-Plates

► Hugo De Clerck



De Clerck HJ, Cornelis MA, Cevidanes LH, Heymann GC, Tulloch CJ. Orthopedic traction of the maxilla with miniplates: a new perspective for treatment of midface deficiency. *J Oral Maxillofac Surg.* 2009 Oct;67(10):2123-9. doi: 10.1016/j.joms.2009.03.007. PMID: 19761906; PMCID: PMC2910397.



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Definitions: Airway \neq OSA What matters is OSA, not “Airway”

- ▶ A wide road/airway does not mean there is no traffic/no obstruction
- ▶ A narrow road/airway does not mean there is traffic/obstruction
- ▶ We care about the traffic/obstruction, not road width/airway



Kazmierski RH. Obstructive sleep apnea: What is an orthodontist's role?
Prog Orthod. 2024 Jul 1;25(1):21. doi: 10.1186/s40510-024-00524-4.
PMID: 38945976; PMCID: PMC11214936.



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OSA, Position paper from AHA:

Problem:

- ▶ OSA can cause:
 - ❖ Coronary artery disease
 - ❖ Heart attack, and
 - ❖ Heart failure
 - ❖ Premature death

Only Ethical Solution:

- ▶ Referral to a Sleep Specialist (Physician Board Certified in Sleep Medicine, PBCSM)

Yeghiazarians Y, Jneid H, Tietjens JR, Redline S, Brown DL, El-Sherif N, Mehra R, Bozkurt B, Ndumele CE, Somers VK. Obstructive Sleep Apnea and Cardiovascular Disease: A Scientific Statement From the American Heart Association. *Circulation*. 2021 Jul 20;144(3):e56-e67. doi: 10.1161/CIR.0000000000000988. Epub 2021 Jun 21. Erratum in: *Circulation*. 2022 Mar 22;145(12):e775. doi: 10.1161/CIR.0000000000001043. PMID: 34148375.



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OSA: Orthodontists Role

I. Screening for OSA

❖ Pediatric Patient Screening:

- Pediatric Sleep questionnaire for children
- Modified Mallampati assessment for the palatine tonsils

❖ Adult Patient Screening:

- STOP-Bang questionnaire

II. Treating as part of a team that includes a Sleep Specialist

Abrishami A, Khajehdehi A, Chung F. A systematic review of screening questionnaires for obstructive sleep apnea. *Can J Anaesth.* 2010 May;57(5):423-38. doi: 10.1007/s12630-010-9280-x. Epub 2010 Feb 9. PMID: 20143278.

Kuskonmaz CS, Bruno G, Bartolucci ML, Basilicata M, Gracco A, De Stefani A. Correlation between Malocclusions, Tonsillar Grading and Mallampati Modified Scale: A Retrospective Observational Study. *Children.* 2023;10(6):1061.



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Diagnosis for OSA: CBCT

Zimmerman JN, Vora SR, Pliska BT.

- ▶ 6 examiners, 10 patients, evaluations 4 weeks apart

Conclusion:

- ▶ Cone beam computed tomography (CBCT) images, **lack reliability and consistency in intra and inter-operator airway analysis**

Zimmerman JN, Vora SR, Pliska BT.
Reliability of upper airway assessment
using CBCT. Eur J Orthod.
2019;41(1):101–8.



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Diagnosis for OSA: CBCT

Zimmerman JN, Lee J, Pliska BT.

- ▶ Systematic review utilizing 5 of 42 reviewed studies
- ▶ Cross-sectional area measurements not reliable
- ▶ Threshold sensitivity lacking protocols
- ▶ **Concluded: Reliability has not been adequately established**

Also

- ▶ Limitations, such as static imagery attempting to view dynamic neuromuscular processes, the patient is upright, awake, and not having an apneic event.

Zimmerman JN, Lee J, Pliska BT. Reliability of upper pharyngeal airway assessment using dental CBCT: a systematic review. *Eur J Orthod.* 2017;39(5):489–96.



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Diagnosis of OSA: 2D Lateral Ceph

Eslami E, Katz ES, Baghdady M, Abramovitch K, Masoud MI.

- ▶ Systematic review using 11 studies
- ▶ Studied 2D lateral cephalograms' ability to predict CBCT 3D volumetric measurements of airway.

Concluded:

- ▶ No strong correlations were reported between the lateral cephalometric and CBCT scans.
- ▶ **Lateral cephalometric radiographs are only appropriate as an initial screening tool.**

Eslami E, Katz ES, Baghdady M, Abramovitch K, Masoud MI. Are three dimensional airway evaluations obtained through computed and cone-beam computed tomography scans predictable from lateral cephalograms? A systematic review of evidence. Angle Orthod. 2017;87(1):159–67.



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Diagnosis for OSA: PSG

- ▶ **Polysomnography (PSG) is the Gold Standard**
- ▶ Is a direct measurement of apneic and hypopnea events (AHI)
- ▶ Cannot determine OSA for certain without PSG pre-treatment
- ▶ Cannot determine whether OSA is cured without PSG post-treatment

Kapur VK, Auckley DH, Chowdhuri S, Kuhlmann DC, Mehra R, Ramar K, Harrod CG. Clinical practice guideline for diagnostic testing for adult obstructive sleep apnea: an American Academy of Sleep Medicine clinical practice guideline. *J Clin Sleep Med.* 2017;13(3):479–504.



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Diagnosis for OSA: PSG for Children

- ▶ Endorsed by the American Academy of Pediatrics
- ▶ For research with children:
 - ❖ Need follow-up time point and a control group, to determine if correction would not have happened naturally

Marcus CL, Brooks LJ, Draper KA, Gozal D, Halbower AC, Jones J, Schechter MS, Sheldon SH, Spruyt K, Ward SD, Lehmann C, Shiffman RN, American Academy of Pediatrics. Diagnosis and management of childhood obstructive sleep apnea syndrome. *Pediatrics*. 2012;130(3):576–84. <https://doi.org/10.1542/peds.2012-1671>. Epub 2012 Aug 27. PMID:22926173



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Expansion: Children and OSA

Fernandez-Barriaes M, de Mendoza IL-I, Pacheco JJA-F, Aguirre-Urizar JM.

- ▶ **Systematic review of pediatric RCTs utilizing PSG pre and post-treatment, and a control group.**
- ▶ **Exclusion criteria: No sleep study (no diagnosis of OSA), no pre and post-treatment AHI, patients with craniofacial syndromes, no control group or control group without OSA, case reports, opinions**

Conclusion:

- ▶ **On pediatric patients with OSA, watchful waiting has an equivalent effect on any change in the apnea-hypopnea index (AHI) as palatal expansion**

Fernandez-Barriaes M, de Mendoza IL-I, Pacheco JJA-F, Aguirre-Urizar JM.
Rapid maxillary expansion versus watchful waiting in pediatric OSA: a systematic review. Sleep Medicine Reviews, 2022.



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Expansion: Adults and OSA

- ▶ Over 1000 studies on expansion and OSA.
- ▶ Very few once we eliminate those without PSG pre and post treatment, a control group, and elimination of selection bias. Long term follow-up is rarer still.

Oliveira LT, Abreu LG, Silveira GS, de Araújo VE, Oliveira DD.

- ▶ After meta analysis concluded that: Maxillary expansion could improve OSA for some adults in the short term. However, the quality of the evidence was very low.

1007 searched to 15 read to 5 included

Oliveira LT, Abreu LG, Silveira GS, de Araújo VE, Oliveira DD. Does surgically assisted maxillary expansion improve obstructive sleep apnea in adults? A systematic review and meta-analysis. Evid Based Dent. 2022 Dec 8. doi: 10.1038/s41432-022-0829-7. Epub ahead of print. PMID: 36482194.



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Conclusions from American Academy of Dental Sleep Medicine (AADSM) position paper:

Panel selected from the AADSM

- ▶ Looked at “Novel Therapies for preventing, managing, and curing OSA”
- ▶ These included: Functional appliances, myofunctional orthodontics, **expansion**, myofunctional therapy, lingual and buccal releases, ablative laser therapy, non-ablative laser therapy

For expansion:

- ▶ **Insufficient evidence to support the use of the therapy as a monotherapy**

For all therapies:

- ▶ “... none of the reviewed therapies were appropriate as first-line monotherapies”

Sheats, R., Masse, J., Levine, M., Aarab, G., Cruz, M. M. E., Simmons, M., Stauffer, J., Carstensen, S., Chiang, H., Galang-Boquiren, M. T., & Postol, K. (2024). Novel therapies for preventing, managing and treating obstructive sleep apnea and snoring in pediatric and adult patients. *Journal of Dental Sleep Medicine*, 11(2). <https://doi.org/10.15331/jdsm.7332>



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OSA: Extractions

Larson, 2015

- ▶ 5,584 patients

Conclusion:

- ▶ ... "extraction orthodontic treatment," is not supported as a significant factor in the cause of OSA.

Larsen AJ, Rindal DB, Hatch JP, Kane S, Asche SE, Carvalho C, Rugh J. Evidence supports no relationship between obstructive sleep apnea and premolar extraction: an electronic health records review. J Clin Sleep Med. 2015;11(12):1443–8.



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OSA, What works, Dental?

- ▶ Maxillomandibular advancement MMA
- ▶ 85% success rate
- ▶ 38.5% completely cured

Zaghi S, Holty J-EC, Certal V, Abdullatif J, Guilleminault C, Powell NB, Riley RW, Camacho M. Maxillomandibular advancement for the treatment of obstructive sleep apnea: a meta-analysis. *JAMA Otolaryngol-Head Neck Surg.* 2016;142(1):58–66.



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OSA, What works, Dental?

▶ Mandibular advancement devices (MAD)

Limitations

- ▶ A treatment not a cure (ongoing)
- ▶ Flaring of mandibular incisors
- ▶ Edge-to-edge or negative overjet
- ▶ Class III malocclusion

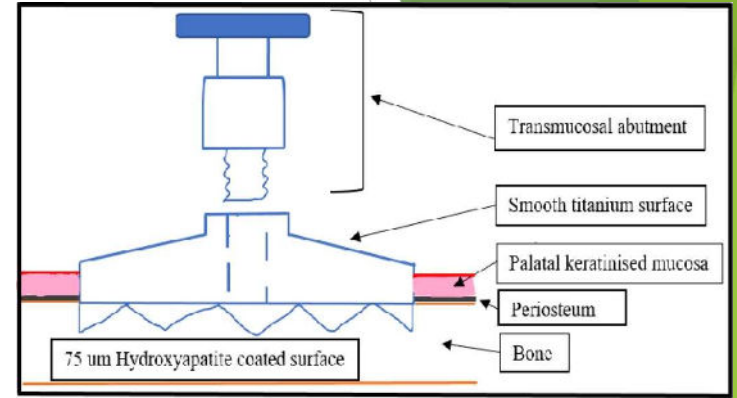
Bartolucci ML, Bortolotti F, Martina S, Corazza G, Michelotti A, Alessandri-Bonetti G. Dental and skeletal long-term side effects of mandibular advancement devices in obstructive sleep apnea patients: a systematic review with meta-regression analysis. *Eur J Orthod.* 2019;41(1):89–100.



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MAD Thoughts:

► OnPlant?



Block MS, Hoffman DR. A new device for absolute anchorage for orthodontics. Am J Orthod Dentofacial Orthop. 1995 Mar;107(3):251-8. doi: 10.1016/s0889-5406(95)70140-0. PMID: 7879757.

Bisphosphonates:

- ▶ Women 65-79 have a twofold increase risk of death within one year of hip fracture
- ▶ Patients over 75, who had a proximal femoral fracture which required surgery, had a 40% chance of dying within a year

LeBlanc ES, Hillier TA, Pedula KL, et al. Hip Fracture and Increased Short-term but Not Long-term Mortality in Healthy Older Women. *Arch Intern Med*. 2011;171(20):1831–1837. doi:10.1001/archinternmed.2011.447

Karademir G, Bilgin Y, Erşen A, Polat G, Buget MI, Demirel M, Balcı HI. Hip fractures in patients older than 75 years old: Retrospective analysis for prognostic factors. *Int J Surg*. 2015 Dec;24(Pt A):101-4. doi: 10.1016/j.ijssu.2015.11.009. Epub 2015 Nov 10. PMID: 26563486.



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Bisphosphonates and Orthodontics:

- ▶ Zomperdikis VF, Et al., Systematic review, 2020
- ▶ From the AAO Bisphosphonate research center
- ▶ BP administration seems to be associated with:
 - ❖ Prolonged treatment time
 - ❖ Compromised clinical outcomes
 - ❖ Moderate changes on the roots and surrounding tissues of orthodontic patients.
- ▶ “Studies were of rather low quality”

Zymperdikas VF, Yavropoulou MP, Kaklamanos EG, Papadopoulos MA. Effects of systematic bisphosphonate use in patients under orthodontic treatment: a systematic review. Eur J Orthod. 2020 Jan 27;42(1):60-71. doi: 10.1093/ejo/cjz021. PMID: 31009953.



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Oral Surgery and Serum CTX:

- ▶ Awad ME, Et al., Systematic Review 2019
- ▶ Looked at MRONJ (medication-related osteonecrosis of the jaw)
- ▶ Specific consideration of the proposed CTX level cutoff of 150 pg/mL

Conclusion:

- ▶ The strategy cannot be justified by evidence.

Awad ME, Sun C, Jernigan J, Elsalanty M. Serum C-terminal cross-linking telopeptide level as a predictive biomarker of osteonecrosis after dentoalveolar surgery in patients receiving bisphosphonate therapy: Systematic review and meta-analysis. J Am Dent Assoc. 2019 Aug;150(8):664-675.e8. doi: 10.1016/j.adaj.2019.03.006. Epub 2019 Jun 28. PMID: 31256803; PMCID: PMC6839407.



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Bisphosphonate Protocol (Mine):

- ▶ 2007 Guidelines from J Oral and Maxillofacial Surgery
- ▶ A stratification of relative risk by CTX values

Levels	2007 Surgical Prediction	My Experience
Below 100 pg/ml	High Risk	NA
100 - 150 pg/ml	Moderate Risk	Undetectable to very slow
150 - 200 pg/ml	Minimal Risk	Slow to moderate
200+ pg/ml	-	Normal Movement

Marx RE, Cillo JE Jr, Ulloa JJ. Oral bisphosphonate-induced osteonecrosis: risk factors, prediction of risk using serum CTX testing, prevention, and treatment. J Oral Maxillofac Surg. 2007 Dec;65(12):2397-410. doi: 10.1016/j.joms.2007.08.003. PMID: 18022461.



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Serum CTX Lab Request (mine):

Rx: Patient Name, DOB, Date

12 Hour Fasting, AM, Serum CTX
(C-Terminal Telopeptide)

Report results in pg/ml

Fax results to ...

Please also mail to ...



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Etch and prime



Hard Palate for Thermoformed Retainers



+



Or



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Small Pearls, Bonded upper 1-1 wire



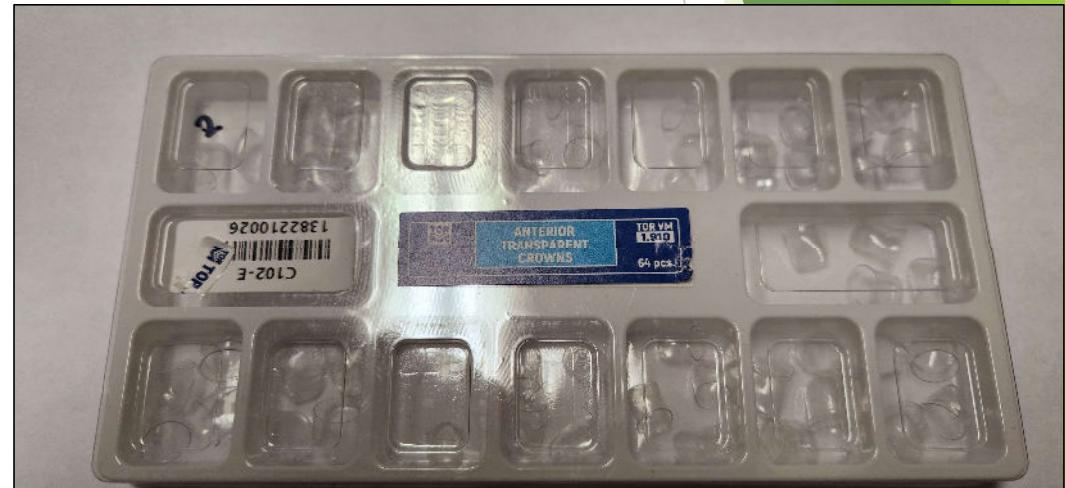
Robert Kazmierski Facebook Post
<https://shorturl.at/623iF>



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Small Pearls, Small Laterals

► Armamentarium:



Small Pearl, Faster Treatment:

- ▶ Finish treatment before we start!!!

DIY Flux Capacitor



Dr. Emmett Brown, Inventor



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Thank You!

Academy for Orthodontic Excellence

Thank you to:
Dr. Ron Jawor

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