

Classic Hyrax, MARPE, SARPE, and OSA, What Does The Evidence Say?

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Thank you to:
Dr. Drew Smith
Dr. Timothy Foley
Dr. Ali Tassi



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Reasons for expansion?

- ▶ Correction of posterior crossbite
- ▶ Correction of maxillary transverse discrepancy in the absence of crossbite
- ▶ Create space for crowding?
 - ▶ 1mm increase in premolar width increases arch perimeter by 0.7mm.
(M. Adkins, R. Nanda, and GF Currier)
 - ▶ The maximum arch perimeter increase obtainable through maxillary expansion is 5 to 6mm, about the width of a mandibular central incisor.
(N. Kravitz)
- ▶ Improve Airway (Treat or prevent Obstructive Sleep Apnea, OSA)?

Adkins MD, Nanda RS, Currier GF. Arch perimeter changes on rapid palatal expansion. *Am J Orthod Dentofacial Orthop.* 1990 Mar;97(3):194-9. doi: 10.1016/S0889-5406(05)80051-4. PMID: 2178393.

Kravitz, Neal. (2023). Everybody gets an expander. *Seminars in Orthodontics.* 29. 10.1053/j.sodo.2023.05.002 .



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MARPE and OSA/ SDB?

Yagci Et al., EJO, April 2026

- ▶ Ages 14-17
- ▶ Control, bonded expander, MARPE
- ▶ MARPE group had greatest decrease in AHI

Soylu S, Yagci A, Kokoglu K. The impact of different rapid palatal expansion appliances on sleep, nasal airway resistance, and dentoskeletal/dentoalveolar characteristics: a prospective, randomized controlled trial. Eur J Orthod. 2026 Apr 3;48(3):cjag030. doi: 10.1093/ejo/cjag030. PMID: 42186098.



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MARPE and OSA/ SDB?

Issues:

- ▶ Control group did not have crossbite
- ▶ Treatment group medically neglected?
- ▶ Non-Growing patients
- ▶ Research already shows occasional improvement in AHI from adult expansion. Short-term low-quality evidence
- ▶ Follow up was 3 months, short-term
- ▶ Does not justify expansion without orthodontic indication
- ▶ Does not justify expansion on growing children, especially 3 and 4 years old.

Soylu S, Yagci A, Kokoglu K. The impact of different rapid palatal expansion appliances on sleep, nasal airway resistance, and dentoskeletal/dentoalveolar characteristics: a prospective, randomized controlled trial. Eur J Orthod. 2026 Apr 3;48(3):cjag030. doi: 10.1093/ejo/cjag030. PMID: 42186098.

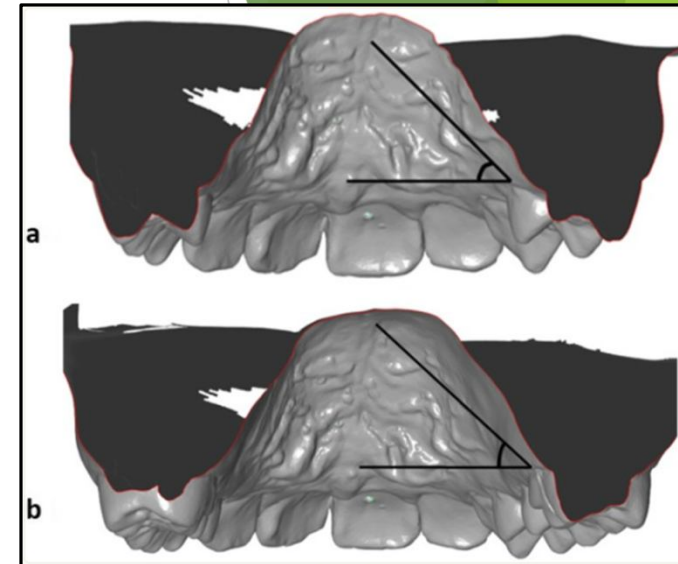


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Classic Hyrax, Early:

Kinzinger GSM Et al. 2022,

- ▶ 114 patients
- ▶ Early mixed dentition vs. Late mixed dentition
- ▶ Palatal expansion results in more parallel expansion when done in the mixed dentition.
- ▶ Conclusion: Early mixed dentition is ideal time for expansion



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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Primary Molar Anchorage:

Cozzani Et al. 2007

- ▶ **Used HAAS Expanders attached to primary dentition**

Serafin Et Al. 2025

- ▶ **Systematic review and meta-analysis**
- ▶ **17 studies, 6 RCTs.**

Cozzani M, Guiducci A, Mirengi S, Mutinelli S, Sciliani G. Arch width changes with a rapid maxillary expansion appliance anchored to the primary teeth. *Angle Orthod.* 2007 Mar;77(2):296-302. doi: 10.2319/0003-3219(2007)077[0296:AWCWAR]2.0.CO;2. PMID: 17319765.

Serafin M, Vella M, Boccalari E, Caprioglio A. Effectiveness of deciduous molar anchorage for rapid maxillary expansion: a systematic review and meta-analysis. *Angle Orthod.* 2026 Feb 19;96(2):231-242. doi: 10.2319/033125-257.1. PMID: 41241386; PMCID: PMC12962274.



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Lower age limit for MARPE What does the evidence say?

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**

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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Lower age limit for MARPE

What does the evidence say?

What did they find?

- ▶ **0.6mm greater expansion of the palatal suture with TBB**
 - ❖ **This disappeared a year later**
- ▶ **0.7 mm greater expansion of the nasal width**
 - ❖ **This did not disappear 1 year and 5 years later.**
- ▶ **Are these differences clinically significant?**
- ▶ **Conclusions on age-appropriate treatment?**

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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Results from the father of “ Force-Controlled Polycyclic Protocol (FCPC)”

Winsauer H, Walter A, Katsaros C, Ploder O

- ▶ Consecutively treated 33 patients 18 to 49 years, mean of 26.8 years
- ▶ 18.5% complication rate. All were hardware-related
- ▶ Reported 84.4 percent sutural separation.
- ▶ Found the effects of gender to be “not significant”.
- ▶ **Reported odds of non-separation increased by 17.9% for every year above 18 years of age.**



Winsauer H, Walter A, Katsaros C, Ploder O. Success and complication rate of miniscrew assisted non-surgical palatal expansion in adults - a consecutive study using a novel force-controlled polycyclic activation protocol. *Head Face Med.* 2021 Dec 11;17(1):50. doi: 10.1186/s13005-021-00301-2. PMID: 34895287; PMCID: PMC8665552.



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What happens with age and gender?

Jeon JY, Choi SH, Chung CJ, Lee KJ.

- ▶ In 2022, looked at 215 MARPE subjects 6 to 60 years old with regard to age, gender, success of suture separation, and amount of suture separation or “suture separation ratio” with periapical radiographs. A retrospective study.

What did they find?

- ▶ Overall, successful sutural separation occurred in 79.53%, or 80% with a 20% failure rate. However, ...
- ▶ For males (mean 20.53 years, 8-38 years) success rate was 61.05%
- ▶ For females (mean 19.58 years, 6-60 years) success rate was 94.17%
- ▶ This dropped to males 53.85% and females 92.59% after 15 years old.
- ▶ The odds of achieving sutural separation for a female patient 21-25 years old were 22.00 times greater than a male
- ▶ Continued ...

Jeon JY, Choi SH, Chung CJ, Lee KJ. The success and effectiveness of miniscrew-assisted rapid palatal expansion are age- and sex-dependent. *Clin Oral Investig*. 2022 Mar;26(3):2993-3003. doi: 10.1007/s00784-021-04281-0. Epub 2021 Nov 25. PMID: 34821980; PMCID: PMC8898235.

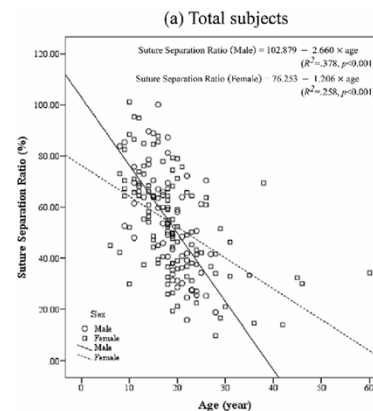
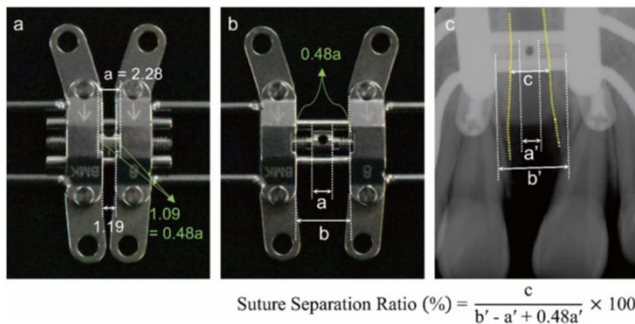


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Suture separation ratio with age and gender?

Jeon JY, Choi SH, Chung CJ, Lee KJ.

- ▶ The ratio of separation of the appliance to separation of the suture, as measured on periapical radiographs.
- ▶ Sutural expansion ratio decreased with increased age
- ▶ This result was found for semi-rigid and rigid appliances
- ▶ This effect was greater in males



Jeon JY, Choi SH, Chung CJ, Lee KJ. The success and effectiveness of miniscrew-assisted rapid palatal expansion are age- and sex-dependent. *Clin Oral Investig.* 2022 Mar;26(3):2993-3003. doi: 10.1007/s00784-021-04281-0. Epub 2021 Nov 25. PMID: 34821980; PMCID: PMC8898235.



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Are there risks associated with MARPE?

Bud ES, Bică CI, Păcurar M, Vaida P, Vlasa A, Martha K, Bud A.

- ▶ Study of 27 patients 19 to 35 years of age
- ▶ Skeletal and dentoalveolar changes measured with CBCT

What did they find?

- ▶ Bone height of the alveolar crest at the first molars decreased by approximately 2.07mm in 40.7% of cases
- ▶ Occlusal plane changes observed in 37% of cases
- ▶ 22.22% of cases showed hypertrophy/hyperplasia of the gingival mucosa
- ▶ The success rate in separation of the mid-palatal suture was 88.88%, which means that in 11.12% of their MARPE patients, the suture was not separated

Bud ES, Bică CI, Păcurar M, Vaida P, Vlasa A, Martha K, Bud A. Observational Study Regarding Possible Side Effects of Miniscrew-Assisted Rapid Palatal Expander (MARPE) with or without the Use of Corticopuncture Therapy. *Biology (Basel)*. 2021 Mar 3;10(3):187. doi: 10.3390/biology10030187. PMID: 33802266; PMCID: PMC8001817.



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Case Reports

Ludwig B, Biondi G, Iodice G, Aghazada H, Perrotta S.

- ▶ Expected soft tissue: Inflammation, pain, pulpitis, TAD deformation
- ▶ TAD fracture
- ▶ Tooth loss, tooth fracture, damage to periodontium, tooth attachment failure leading to endodontic problems
- ▶ Facial asymmetry
- ▶ Unaesthetically wide nose shapes
- ▶ Loss of papillary height and loss of papilla
- ▶ Asymmetric expansion, in all dimensions
- ▶ Asymmetric zygomatic expansion, with resulting altered facial esthetics.
- ▶ Severe asymmetric expansion with one side not expanding at all
- ▶ Nose bleed
- ▶ Orbital fracture with partial, temporary, sight issues
- ▶ Cranial base fracture, and leakage of CSF
- ▶ Vomer fracture

Ludwig B, Biondi G, Iodice G, Aghazada H, Perrotta S. Boneborne maxillary expansion: A clinical report of potential challenges. *J Clin Orthod.* 2024 Jan;58(1):22-28. PMID: 38554402.



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JCO “The Readers’ Corner”

Results of 97 orthodontist’s responses to a survey emailed to randomly selected JCO readers

- ▶ 60% of respondents used MARPE
- ▶ Mean age of transition from Classic Hyrax to MARPE was 15.4 years (10-22)
- ▶ Mean maximum age was 27 (16-48). Three respondents had no upper limit
- ▶ Complications reported by 33%
- ▶ Reported: device breakage, tissue overgrowth, nasal-aperture asymmetry, occlusal plane canting, openbite
- ▶ Of complications: 25% mild and easily resolved with orthodontic treatment
- ▶ 50% Moderate though still resolvable with orthodontic treatment
- ▶ **25% Severe and difficult to resolve or not resolvable with orthodontic treatment.**

Kazmierski, R.: The Readers Corner, J. Clin. Orthod. 58:409-416, 2024



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Books:

- ▶ **Unconventional Success:** A Fundamental Approach to Personal Investment 1st Edition, by [David F. Swensen](#)

Institutional investor for Yale

- ▶ **The Four Pillars of Investing:** Lessons for Building a Winning Portfolio, by [William J Bernstein](#)

American financial theorist and neurologist

- ▶ Also: **The Ages of the Investor:** A Critical Look at Life-cycle Investing (Investing for Adults Book 1), by [William J Bernstein](#)

- ▶ **The Bogleheads' Guide to Retirement Planning**

- ▶ **Stocks for the Long Run:** The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies, by [Jeremy J. Siegel](#)

Professor of Finance at the Wharton School

- ▶ **Asset Allocation 5E (PB):** Balancing Financial Risk, by [Roger C. Gibson](#)

- ▶ **The Only Guide to a Winning Bond Strategy You'll Ever Need:** The Way Smart Money Preserves Wealth Today 1st Edition, by [Larry E. Swedroe](#) , [Joseph H. Hertenstein](#)



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Books Cont.

- ▶ **The Little Book of Common Sense Investing:** The Only Way to Guarantee Your Fair Share of Stock Market Returns (Little Books. Big Profits), by [John C. Bogle](#)
- ▶ **Where Are the Customers' Yachts?:** or A Good Hard Look at Wall Street, by [Fred Schwed](#)
- ▶ **Winning the Loser's Game, Seventh Edition:** Timeless Strategies for Successful Investing, by [Charles D. Ellis](#)
- ▶ **All About Asset Allocation, Second Edition Kindle Edition,** by [Richard A. Ferri](#)
- ▶ **One Up On Wall Street:** How To Use What You Already Know To Make Money, by [Peter Lynch](#)
- ▶ **Common Stocks and Uncommon Profits and Other Writings,** by [Philip A. Fisher](#)
- ▶ **University of Berkshire Hathaway:** 30 Years of Lessons Learned from Warren Buffett & Charlie Munger at the Annual Shareholders Meeting, by [Daniel Pecaut](#) , [Corey Wrenn](#)



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Thank You!

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Thank you to:

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<https://moorestownorthodontics.com/blog/>



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