Definitions: Airway ≠ OSA

What matters is blockage not size

- 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. **Referring to a sleep physician when OSA/SDB is suspected**

III. **Treating for OSA/SDB only as part of a team that includes a Sleep physician**

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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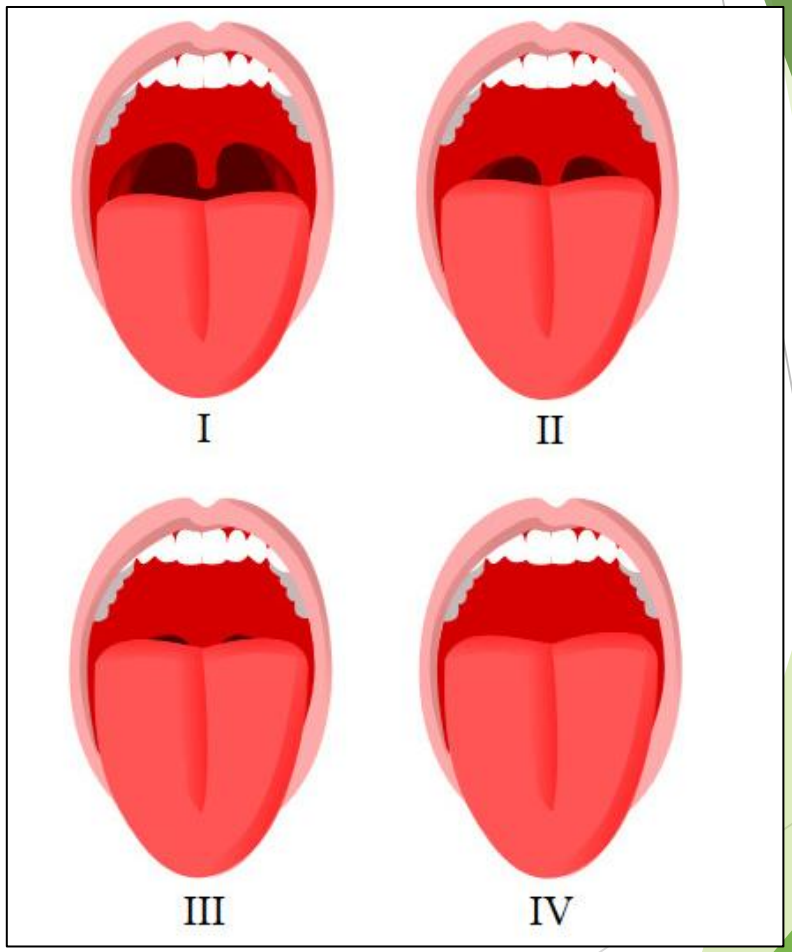
OSA: Orthodontists Role

Modified Mallampati Assessment

Class 0: Epiglottis partially or fully visible

- Class I: Full view of soft palate, uvula, and tonsillar pillars
- Class II: Soft palate and uvula visible, pillars obscured
- Class III: Soft palate and uvula base visible
- Class IV: Visualization restricted to the hard palate



Jackson JS, Rondeau B. Mallampati Score. 2025 Jul 7. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 36256766.

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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.

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.

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.

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.

Expansion: Children and OSA

Fernandez-Barriales 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-Barriales 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.

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.

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

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.

PSG with Multidetector CT

- Retroglossal pharyngeal narrowing during sleep did not occur in the OSA group subjects
- The retropalatal airway volume … decreased significantly from wakefulness to sleep only among the OSA group subjects.
- **Conclusions:** In patients with OSA, upper airway narrowing during sleep occurs predominantly at the retropalatal level, affecting the anteroposterior and lateral dimensions, being associated with lateral pharyngeal wall enlargement and posterior tongue displacement

Passos UL, Genta PR, Marcondes BF, Lorenzi-Filho G, Gebrim EMMS. State-dependent changes in the upper airway assessed by multidetector CT in healthy individuals and during obstructive events in patients with sleep apnea. J Bras Pneumol. 2019 Aug 15;45(4):e20180264. doi: 10.1590/1806-3713/e20180264. PMID: 31432889; PMCID: PMC6733715.

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.

OSA, What works, Dental?

- Mandibular advancement devices (MAD)

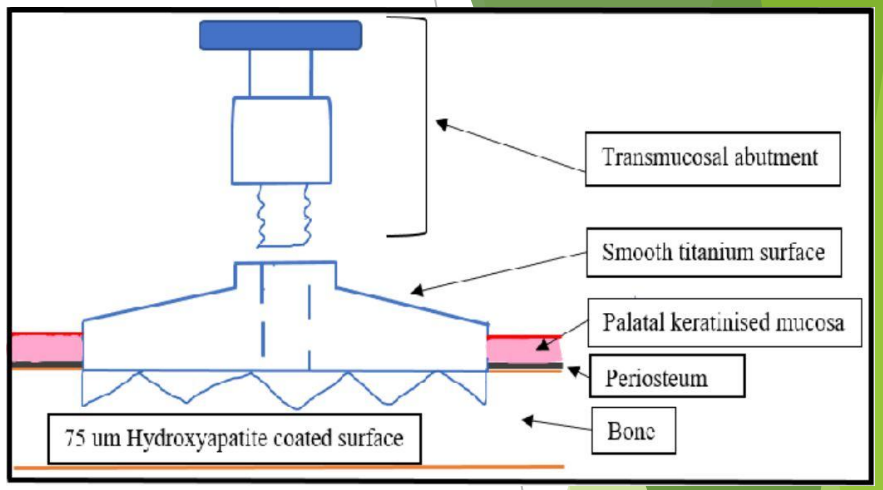
Limitations

- 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.

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.

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.

Sample Counter Evidence:

REVIEWS

Sleep Science

Rapid Maxillary Expansion for Obstructive Sleep Apnea among children - Systematic Review and Meta-analysis

Sarah Ahmed Bahammam

Taibah University, Pediatric Dentistry and Orthodontics - Medina - Saudi Arabia.

ABSTRACT

A systematic review and meta-analysis is conducted for children with obstructive sleep apnea (OSA) treated with rapid maxillary expansion (RME). The study systematically and independently reviewed extracted articles from 2009 to 2019. The quality evaluation and selection of these studies was based on the high quality of NICE criteria. EMBASE, Scopus and other five databases were used to extract international publications. The findings indicated that the apnea-hypopnea index was enhanced after rapid maxillary expansion among children with OSA. It revealed that apnea hypopnea index enhances to 73% in children with obstructive sleep apnea after ≤ three years follow-up, while it was 77% in children with obstructive sleep apnea after > 3 years. The articles included in this meta-analysis reported differential outcomes based on different inclusion or exclusion criteria and diverse patient populations. Critical evaluation of previous literature suggests diagnosing the disorder at an early stage for reducing the adverse health outcomes and formulating an appropriate treatment plan.

Keywords: Apnea Hypopnea Index, Sleep Apnea, Obstructive Sleep Apnea.

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Bahammam SA. Rapid maxillary expansion for obstructive sleep apnea among children-systematic review and meta-analysis. Sleep Sci. 2020;13(01):70–7.

Sample Counter Evidence:

Table 1. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Cohort Study	Personal Blogs
Cross-sectional / Retrospective Study	Essays of REM
Case-controlled Study with Comparison or Control Group	Websites and guest post
Studies that report on rapid maxillary expansion and obstructive sleep apnea treatment	Published studies older version (other than 2009 to 2019)
All languages	Incomplete information

Bahammam SA. Rapid maxillary expansion for obstructive sleep apnea among children-systematic review and meta-analysis. Sleep Sci. 2020;13(01):70–7.

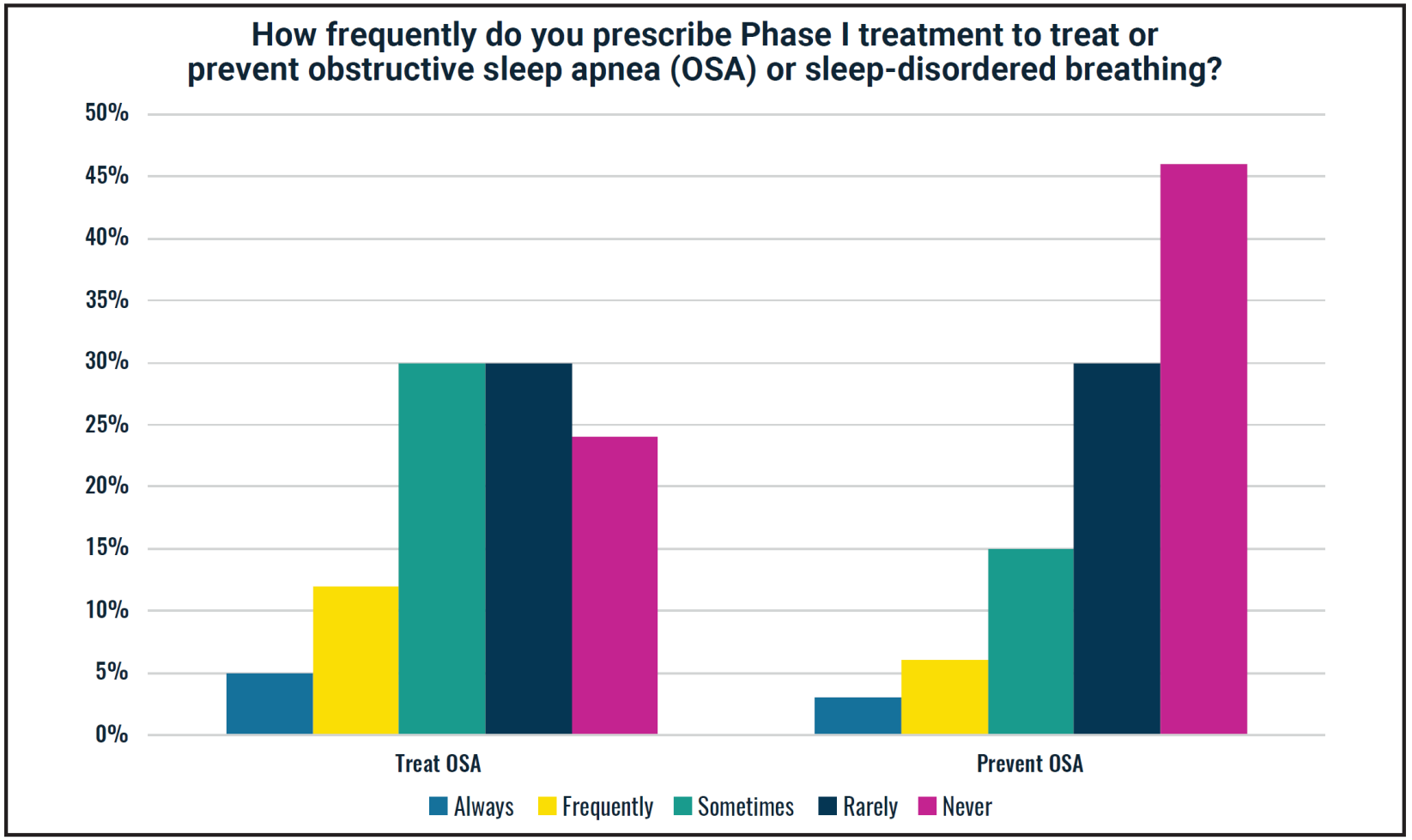
Sample Counter Evidence:

Table 6. Characteristics of the selected studies.

Name of the Author	Year of Publication	Study Title	Type of Study
Campbell[21]	2018	Rapid maxillary expansion and protraction alleviates obstructive sleep apnea in non-syndromic children with cleft palate (doctoral dissertation, UCSF).	Cross-sectional
Campbell[21]	2018	Rapid maxillary expansion and protraction alleviates obstructive sleep apnea in non-syndromic children with cleft palate (doctoral dissertation, UCSF).	Cross-sectional
Guilleminault et al.[23]	2011	Adeno-tonsillectomy and rapid maxillary distraction in pre-pubertal children, a pilot study.	Pilot Study
Taddei et al.[24]	2015	Effects of rapid maxillary expansion and mandibular advancement on upper airways in Marfan's syndrome children: a home sleep study and cephalometric evaluation.	Experiment
Buccheri et al.[25]	2017	Rapid maxillary expansion in obstructive sleep apnea in young patients: Cardiorespiratory monitoring.	Cross-sectional
Pirelli et al.[26]	2012	Rapid maxillary expansion before and after adenotonsillectomy in children with obstructive sleep apnea.	Experimental study
Kim[27]	2014	Orthodontic treatment with rapid maxillary expansion for treating a boy with severe obstructive sleep apnea.	Case Study
Helal[28]	2019	Parents' perceptions of breathing pattern changes, sleep quality, and fatigue in children after rapid maxillary expansion: a survey and case series study.	Case series study
Pirelli et al.[29]	2015	Rapid maxillary expansion (RME) for pediatric obstructive sleep apnea: a 12-year follow-up.	Prospective
Villa et al.[7]	2011	Efficacy of rapid maxillary expansion in children with obstructive sleep apnea syndrome: 36 months of follow-up. Sleep and Breathing.	Experimental study
Villa et al.[7]	2011	Efficacy of rapid maxillary expansion in children with obstructive sleep apnea syndrome: 36 months of follow-up. Sleep and Breathing.	Experimental study

Bahammam SA. Rapid maxillary expansion for obstructive sleep apnea among children-systematic review and meta-analysis. Sleep Sci. 2020;13(01):70–7.

The Silent Majority vs. FOMO:



Kazmierski R. The Readers' Corner: November 2025. J Clin Orthod. 2025 Nov;59(11):758-767. PMID: 41453764.

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The Silent Majority vs FOMO:

FREQUENCY OF PHASE I TREATMENT FOR TONGUE POSITION BY YEARS IN PRACTICE

	25 Years or Less	More than 25 Years
Always	0%	14%
Frequently	0	14
Sometimes	21	33
Rarely	43	24
Never	36	14

Kazmierski R. The Readers' Corner: November 2025. J Clin Orthod. 2025 Nov;59(11):758-767. PMID: 41453764.

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