Journal of Dental Sciences 21 (2026) 632–633

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.e-jds.com

Correspondence

No evidence supporting a causal link between orthodontic premolar extraction and obstructive sleep apnea despite radiographic airway changes

KEYWORDS
Orthodontic extraction;
Upper airway;
Obstructive sleep apnea;
Cephalogram;
Anchorage control

Orthodontic techniques are frequently employed in patients with bimaxillary protrusion, severe dental crowding, or those undergoing orthognathic surgery. Premolar extraction is commonly performed to facilitate anterior teeth retraction and resolve crowding. This approach not only enhances dental alignment within the alveolar bone but also contributes to the correction of anteroposterior discrepancies and improves soft tissue profile, particularly in reducing lip protrusion and enhancing facial esthetics.

A recent investigation examining the effects of orthodontic treatment—particularly extraction versus non-extraction protocols—under varying anchorage systems revealed that premolar extraction combined with minimal anchorage may expand the upper and middle pharyngeal airway, potentially supporting improved respiratory function. In contrast, treatment with maximum anchorage for bimaxillary protrusion, while effective in achieving dental objectives, may result in narrowing of the middle and lower airway segments.[1] Although changes in arch length or anterior retraction could theoretically affect upper airway anatomy and influence sleep-related breathing, such implications have not yet been confirmed through objective assessments, such as polysomnography (PSG) or comprehensive sleep studies.

Sleep-disordered breathing is influenced by various anatomical and physiological structures, including the soft palate, tongue, hyoid complex, and posterolateral pharyngeal walls. Abnormalities in these structures may compromise airway patency; however, their presence alone is insufficient to establish a diagnosis of obstructive sleep apnea (OSA). OSA diagnosis typically relies on PSG and validated screening tools such as the modified Mallampati classification, Friedman classification, pediatric sleep questionnaire, STOP-Bang questionnaire, Epworth sleepiness scale, and the nasal obstruction symptom evaluation scale.[2] These instruments may be used individually or combined to generate binary indicators or severity grading. Patients with low clinical scores are generally at low risk for clinically significant OSA and may not require further evaluation, whereas those with high-risk profiles should undergo further diagnostic assessment.

From a clinical standpoint, lateral cephalograms and cone-beam computed tomography (CBCT) scans cannot reliably diagnose airway obstruction or OSA. Lateral cephalograms are limited by their two-dimensional nature and do not adequately represent the complex three-dimensional anatomy of the airway.[3] Although CBCT can provide detailed cross-sectional and volumetric

https://doi.org/10.1016/j.jds.2025.08.033

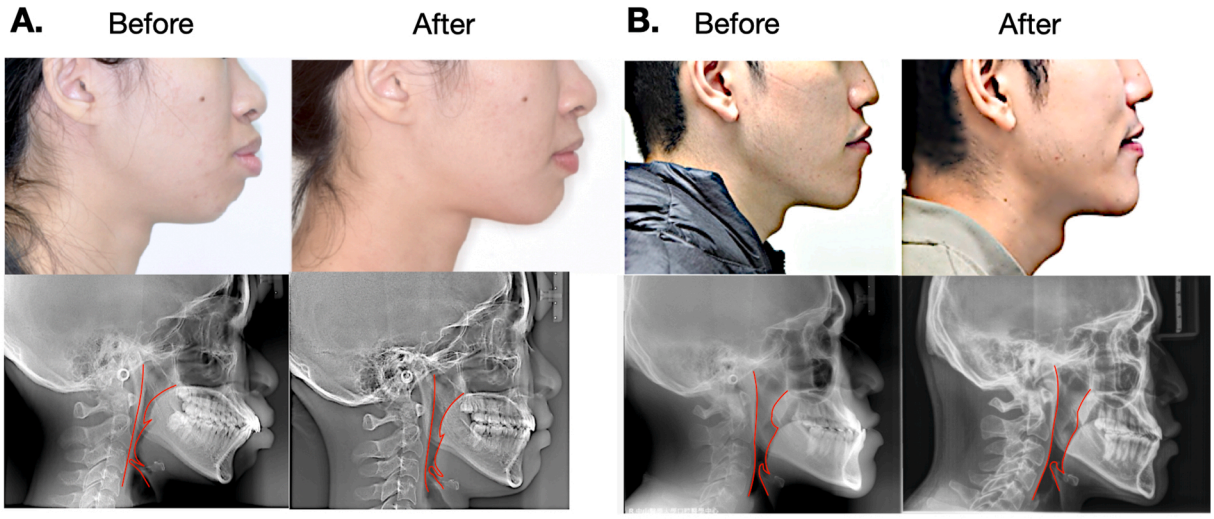

Figure 1 Changes in airway dimensions before and after orthodontic treatment. A. A patient with Class I bimaxillary dentoalveolar protrusion underwent extraction of both maxillary and mandibular first premolars. After orthodontic space closure, post-treatment lateral cephalometric comparison revealed an increase in airway width. The patient did not exhibit any signs or symptoms of sleep-disordered breathing. **B.** A patient diagnosed with skeletal mandibular prognathism with a Class III molar relationship and anterior crossbite received single-arch extraction and orthognathic surgery. The patient underwent a mandibular intraoral vertical ramus osteotomy to set back the mandible, without maxillary extraction. The oropharyngeal airway showed an increase in width postoperatively compared to the narrow airway observed preoperatively. No sleep-disordered breathing was reported. These cases suggest that premolar extraction in both arches to improve dental protrusion, or mandibular setback surgery to correct skeletal discrepancies, may result in observable changes in airway dimensions on lateral cephalograms. However, such treatments do not necessarily lead to airway narrowing. Skilled orthodontic planning and technique selection can prevent negative impacts on the upper airway, even in cases involving posterior movement of the dentition or mandibular repositioning.

information, certain parameters such as the mandibular plane to hyoid bone (MP-H) distance are posture-dependent and thus subject to variability.[4] Consequently, when evaluating airway changes following orthodontic treatment whether with extraction, non-extraction, or orthognathic surgery (Fig. 1) interpretation based solely on cephalometric changes should be approached with caution. Definitive diagnosis of OSA should remain based on PSG or validated clinical screening questionnaires.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

Acknowledgments

This work was supported by a grant from Chung Shan Medical University Hospital (CSH-2025-C-031).

References

1. Germec-Cakan D, Taner T, Akan S. Uvulo-glossopharyngeal dimensions in non-extraction, extraction with minimum anchorage, and extraction with maximum anchorage. *Eur J Orthod* 2011;33:515—20.
2. Randerath W, de Lange J, Hedner J, et al. Current and novel treatment options for obstructive sleep apnoea. *ERJ Open Res* 2022;8:126—47.
3. Bronoosh P, Khojastepour L. Analysis of pharyngeal airway using lateral cephalogram vs CBCT images: a cross-sectional retrospective study. *Open Dent J* 2015;9:263—6.
4. Hsu WE, Wu TY. Comparison of upper airway measurement by lateral cephalogram in upright position and CBCT in supineposition. *J Dent Sci* 2019;14:185—91.

Nia Ayu Ismaniati Noerhadi
Orthodontic Department, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

Tsui-Hsein Huang
Dental Department, Chung Shan Medical University Hospital, Taichung, Taiwan

Chun-Te Ho
Chia-Tze Kao*
Orthodontic Department, Chung Shan Medical University Hospital, Taichung, Taiwan
School of Dentistry, College of Oral Medicine, Chung Shan Medical University, Taichung, Taiwan

* Corresponding author. School of Dentistry, College of Oral Medicine, Chung Shan Medical University, Department of Orthodontics, Chung Shan Medical University Hospital, No. 110, Section 1, Chien Kuo N Road, Taichung, 4007, Taiwan.
E-mail address: ctk@csmu.edu.tw (C.-T. Kao)

Received 17 August 2025
Final revision received 17 August 2025
Available online 26 August 2025