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LETTER TO THE EDITOR

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Meta-Analysis Evaluation

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This systemic review, "Pharyngeal airway dimensional changes after orthodontic treatment with premolar extractions: A systematic review with meta-analysis",[1] provides for an interesting analysis of the studies looking into the effect of serial extraction on the airway. The review dealt with cone beam tomography to evaluate the pharyngeal airway volume with a control group of 342 patients who had not undergone extraction and a group of 268 treated patients. The finding was that no statistically significant difference was found in total, nasopharyngeal, glossopharyngeal, or minimum cross-sectional area (P>0.05) in the extraction group. The study does conclude that there was a statistically significant increase in oropharyngeal volume of 0.41 cm3 (95% confidence interval, 0.05-0.80; P=0.03).

When reviewing this study it is important to evaluate the testing metric to consider whether any conclusions from the studies reviewed were valid in regard to evaluating airway patency. In essence, the studies examined a static anatomic element after a minor surgical procedure.[2,3] Perhaps dentists should consider how other elements affect dimension and sleep in ways extractions do not. I see no reason why extracting bicuspids would have any effect on either the nasopharyngeal or glossopharyngeal areas. These are two separate anatomic structures with no visible connection to teeth. I can understand how extracting bicuspids could result in an increase in oropharyngeal volume because reduction in anteroposterior arch form might effectively provide more space distal to the second molars, thereby creating more of an oropharyngeal space. A flatter facial profile, which in itself could be seen as abnormal, might be expected. I suppose that this attribute of extraction could be addressed with future studies on the effects of serial extractions and the facial profile.

To truly evaluate the hypothesis of these studies, the effect of numerous other physiologic and anatomic factors should be considered. These factors include resting tongue position,[4] swallow pattern, mouth breathing,[5-12] Mallampati index, head position,[8-13] palatal height, tongue tie,[14,15] age, parafunctional habits and breastfeeding,[16] nasal anatomy,[17,18] and body mass index.[19]

I am also aware of the results of the 2015 study, Evidence Supports No Relationship between Obstructive Sleep Apnea and Premolar Extraction: An Electronic Health Records.[20] But once again, the minimal number of variables that were considered has to be taken into account. As the summary of this study stated, "…. there remain many unanswered questions regarding the interaction of the anatomy and physiology of the orofacial region and development of obstructive sleep apnea (OSA)." Having personally examined and treated thousands of patients with significant numbers, I estimate more than 25% of them have undergone serial extraction and now have tongues sitting on top of the lower teeth. I think there needs to be serious research into this issue, taking into consideration the whole of the total patient.

The airway is dynamic and reacts differently when a patient is awake than during sleep. Although cone beam computed tomography evaluation has been shown to be possibly predictive for OSA, it is not diagnostic. Patients with a narrow airway can have no pathology and normal airways with OSA. Studies such as this one on extractions are overly simplistic and have limited clinical value when evaluating a static anatomic structure and extrapolating a conclusion about an extremely complicated dynamic entity that changes with age and the idiosyncrasies of each patient.

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REFERENCES

1. Orabi N, Flores-Mir C, Elshebiny T, Elkordy S, Palomo JN. Pharyngeal airway dimensional changes after orthodontic treatment with premolar extractions: A systematic review with meta-analysis. *Am J Orthod Dentofacial Orthop*. 2021;160(4):503-515.

2. Isono S, Shimada A, Utsugi M, Konno A, Nishino T. Comparison of Static Mechanical Properties of the Passive Pharynx between Normal Children and Children with Sleep-disordered Breathing. *Am J Respir Crit Care Med*. 1998;157:1204-1212.

3. Arens R, McDonough JM, Corbin AM, et al. Upper airway size

analysis by magnetic resonance imaging of children with obstructive sleep apnea syndrome. *Am J Respir Crit Care Med*. 2003;167:65-70.

4. Murat Ozbek M, Toygar Memikoglu UT, Altug-Atac AT, Lowe AA. Stability of Maxillary Expansion and Tongue Posture. A*ngle Orthod*. 2009: 79(2):214-220.

5. Maurice H. Cottle, M.D. The work, ways, and patterns of nasal breathing. (Relevance in Heart and Lung Illness). Presented at American Rhinologic Society seminar on Respiratory Physiology and Rhinomanometry: September 19, 1972, New Orleans, Louisiana.

6. Kim EJ, Choi JH, Kim KW, et al. The impacts of open-mouth breathing on upper airway space in obstructive sleep apnea: 3-D MDCT analysis, *Eur Arch Otorhinolaryngol*. 2011; 268(4):533-539.

7. Jefferson Y. Mouth breathing: adverse effects on facial growth, health, academics, and behavior. *Gen Dent*. 2010 Jan-Feb;58(1):18-25; quiz 26-7, 79-80.

8. da Silveira W, Mello FC, Guimarães FS, Menezes SL. Postural alterations and pulmonary function of mouth-breathing children. *Braz J Otorhinolaryngol*. 2010 Nov-Dec; 76(6):683-686.

9. Conti PBM, Sakano E, Ribeiro MAG, Schivinski CAS, Ribeiro JD. Assessment of the body posture of mouth-breathing children and adolescents. *J Pediatr* (Rio J). 2011;87(4):357-363.

10. Okuro RT, Morcillo AM, Ribeiro MAGO, Sakano E, Conti PBM, Ribeiro JD. Mouth breathing and forward head posture: effects on respiratory biomechanics and exercise capacity in children. *J Bras Pneumol*. 2011;37(4):471-479.

11. Ovsenik M. Incorrect orofacial functions until 5 years of age and their association with posterior crossbite. *Am J Orthod Dentofacial Orthop*. 2009;136(3):375-381.

12. Milanesi JM, Borin G, Corrêa ECR, da Silva AMT, Bortoluzzi DC, Souza JA. Impact of the mouth breathing occurred during childhood in the adult age: biophotogrammetric postural analysis. *Eur J Paediatr Dent*. 2012;13(4):321-323.

13. Sabatucci A, Raffaeli F, Mastrovincenzo M, Luchetta A, Giannone A, Ciavarella D. Breathing pattern and head posture: changes in craniocervical angles. *Minerva Stomatol*. 2015;64(2):59-74.

14. Huang Y-S, Quo S, Berkowski JA, Guilleminault C. Short lingual frenulum and obstructive sleep apnea in children. *Int J Pediatr Res*. 2015;1:1.

15. Marchesan IQ, Lopes de Castro Martinelli R, Gusmão RJ. Lingual frenulum: changes after frenectomy. *J Soc Bras Fonoaudiol*. 2012; 24(4):409-412.

16. Romero CC, Scavone-Junior H, Garib DG, Cotrim-Ferreira FA, Ferreira RI. Breastfeeding and non-nutritive sucking patterns related to the prevalence of anterior open bite in primary dentition. *J Appl Oral Sci*. 2011;19(2):161-168.

17. Bresolin D, Shapiro GG, Shapiro PA, Dassel SW, Furukawa CT, Pierson WE, Chapko M, Bierman CW. Facial characteristics of children who breathe through the mouth. *Pediatrics*. 1984 May;73(5):622-5.

18. Rappai M, Collop N, Kemp S, deShazo R. The nose and sleep-disordered breathing. *Chest*. 2003;124(6):2309-2323.

19. Arens R, Sin S, Nandalike K, et al. Upper airway structure and body fat composition in obese children with obstructive sleep apnea syndrome. *Am J Respir Crit Care Med*. 2011;183:782-787.

20. 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 Dec 15;11(12):1443-8.

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The author has no relevant conflicts of interest to disclose.