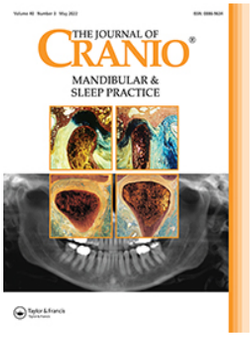

CRANIO®

The Journal of Craniomandibular & Sleep Practice

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ycra20

Can deciduous malocclusion phenotypes predict future respiratory co-morbidity?

Kevin L. Boyd & Steve Carstensen

To cite this article: Kevin L. Boyd & Steve Carstensen (2022) Can deciduous malocclusion phenotypes predict future respiratory co-morbidity?, CRANIO®, 40:3, 185-187, DOI: 10.1080/08869634.2022.2055722

To link to this article: https://doi.org/10.1080/08869634.2022.2055722

Published online: 29 Mar 2022.

CRANIO®: THE JOURNAL OF CRANIOMANDIBULAR & SLEEP PRACTICE
2022, VOL. 40, NO. 3, 185–187
https://doi.org/10.1080/08869634.2022.2055722

Taylor & Francis
Taylor & Francis Group

GUEST EDITORIAL

Can deciduous malocclusion phenotypes predict future respiratory co-morbidity?

The way the teeth come together is the province of dentistry. Pediatric dentists, general dentists who see children, and orthodontists have the skills to address the craniofacial structures and relieve or prevent the pain and suffering sometimes associated with early childhood malocclusion.

The reader may be more familiar with "Early Childhood Caries" (ECC), a term proposed at a 1994 workshop sponsored by the Center for Disease Control [1] and later implemented as an all-inclusive International Classification of Diseases-9th edition (ICD-9) diagnostic descriptor. Prior to that workshop, when describing children of preschool age, typically 3–5 years, who had severe caries, terms like nursing bottle caries, nursing caries syndrome, caries of infancy, primary dental caries, and others were used. Emphasis was placed on overconsumption of fruit juices and other sweet beverages and unhealthy baby bottle usage practices. Rolling all the disparate terms into ECC allowed recommendations for healthy habits to be more efficiently and effectively integrated into practice.

There is not a similar list of terms to describe unhealthy growth and development of the *craniofacial respiratory complex*, the collection of skeletal, soft tissue, and functional anatomy that make up the upper airway. Teeth are part of that complex as they erupt on the maxilla and mandible, providing visual cues such as narrow arches, open bites, and profiles that set too far back, crowding the naso- and/or oropharynx. Following the lead of Early Childhood Caries, we propose the term Early Childhood Malocclusion (ECM).

Evolution and the industrial revolution

Homo sapiens emerged on the African continent some 300,000 years ago from common ancestry with *Homo erectus* [2]. Until about the early-mid 18th century, skeletal malocclusion was seldom seen in our species. Pre-industrial human skulls show very little variation in skeletal morphology [3]. Current populations are quite different: recent studies published in Medline report the worldwide prevalence of malocclusion to be 56%. Data shows that malocclusion prevalence in the primary dentition is 54%; thus, it persists into the permanent dentition [4]. This strongly implies that ECM is infrequently self-correcting.

What happened to cause this shift as industrialization took hold in the population? Larsen [5], a leading biological anthropologist, suggests a gracilization-effect, describing our skeletons as being more slender and less strong, as an explanation for this sudden appearance of malocclusion. Narrowing, retrusion, and lengthening of the facial skeleton and jaws are often the result of decreased force of mastication required to chew softer foods. Agriculture intensification, industrial processing, and softening of the food supply, including artificial infant formulas and pureed baby foods, have made eating less physically challenging for the masticatory structures. Why should they grow big and strong?

Early childhood malocclusion

ECC describes dental caries in children under age six years old (under 72 months); it, thus, seems reasonable to suggest a similar definitive diagnostic moniker, *early childhood malocclusion* (ECM), as useful for identifying skeletal malocclusion traits when occurring before age six. Specific ECM signs detectable during early childhood include maxillary transverse deficiency (with/without posterior crossbite) [6,7], Angle Class II mandibular retrusion [8,9], and excessive vertical facial growth (adenoid face, long-face syndrome) [10], or insufficient vertical development (deep-bite) [11]. As noted above, these traits do not self-correct during the growth years, launching the child into puberty, adolescence, and adulthood with the skeletal deficiencies of ECM. Even in childhood, ECM Is frequently associated with symptoms of sleep disordered breathing/obstructive sleep apnea (SDB/OSA) [12]. Untreated pediatric SDB/OSA can render some children susceptible to other systemic illnesses such as adolescent cardiovascular disease [13], ADD/ADHD [14], lowered overall oral health-related quality of life (OHRQOL) [15], and other issues associated with poorer general health. Ignoring ECM or deferring treatments until systemic comorbidities have become more severe with age ("watchful waiting" or "they'll grow out of it") seems a medically indefensible position.

Strategies are not new

Myriad publications from the late 19th through early 21st centuries describe expansion of the hard palate to

correct maxillary transverse deficiency, improve quality of life, and relieve systemic symptoms such as adenotonsillar hypertrophy [16] and conductive hearing loss [17] often associated with chronic mouth-breathing and poor sleep hygiene.

Since many ECM phenotypes are seldom self-correcting and early systemic co-morbidity symptoms will often worsen, impacting quality of life and potentially creating irreversible health challenges as the child grows, why do many orthodontic professionals often recommend delaying intervention until all the permanent teeth have erupted before starting corrective procedures [18]? Has it always been so?

Prior to World War II, many esteemed orthodontists were very outspoken about the vital importance of early detection and correction of malocclusion. In 1933, Singleton [19] opined, "It is from the human side of orthodontia that the urge rises to harken to the appeal of the pedodontist. These specialists feel that the orthodontist, who examines the teeth of children from 3 to 5 years of age and presents to the parents a picture of incipient malocclusion, is not rendering his full duty to society if he has nothing better to offer than recommendations of delay until the malocclusion becomes objectively apparent when procedures of a mechanical nature may be instituted to correct the defect." In his conclusion, Singleton emphatically proclaimed, "The problems of growth and development in infancy and juvenility should be attacked with vigor. The appeal of the children's dentist should receive a response, and the anxiety of the mothers who present their children for infantile diagnosis should be satisfied. The orthodontist should be no more excused from his responsibility to society in making a more thorough investigation of the etiology of incipient malocclusion than the dentist should be relieved of his efforts to prevent dental caries by means of dietetic or prophylactic measures."

Current American Association of Orthodontists (AAO) guidelines suggest that children should be seen for their first orthodontic evaluation "no later than seven years old" but indicate treatment is usually deferred to "between the ages of 9 and 11" [20]. However, these recommendations emerged from a 1990 AAO policy meeting that suggested, **" . . . a child's first orthodontic examination should be performed at the first recognition of the existence of an orthodontic problem, but no later than age seven. Such examination may occur at birth or age two or when the primary teeth erupt, depending upon the specific nature of the child's problem . . . ."** Where are the orthodontists of today, then, when the child is not yet seven years old?

I suggest another potential obstacle precludes orthodontists from wanting to treat ECM: maybe they feel unprepared. Post-graduate Orthodontic residency programs in the United States are devoid of clinical and didactic learning opportunities instructing future orthodontists how to deal with the disruptive and age-appropriate anxiety-driven behaviors exhibited by many young children when they are first experiencing a dental visit. In review of the Commission on Dental Accreditation (CODA) curriculum guideline document for the specialty of Orthodontics [21], training requirements in Pediatric Behavior Guidance do not exist. The implication seems clear: Why should Orthodontic residents be expected to learn how to understand and manage the normal fears, anxiety, and curiosity-driven behaviors of a preschooler who might be in dire need of their therapeutic services?

Relieving and preventing the suffering associated with progressive caries and periodontal disease in children have long been objectives of the dental profession. The American Dental Association has established a Pediatric Airway Health task force [22], and the American Academy of Pediatric Dentistry [23] has published clear policy statements regarding how and why airway health in children is a vital component of what defines oral health. Training opportunities aimed at preparing current and future clinicians of every discipline to relieve and prevent the sometimes life-altering pain and suffering that can accompany progressive ECM should immediately take their rightful place within the dental and medical education academic arena.

References

[1] Colak H, Dülgergil CT, Dalli M, et al. Early childhood caries update: a review of causes, diagnoses, and treatments. J Nat Sci Biol Med. 2013;4(1):29–38.

[2] Callaway EN. 2017. [Internet] Oldest *Homo Sapiens* fossil claim rewrites our species' history. Available from: [cited 2022 Mar 8]. https://doi.org/10.1038/nature.2017.22114

[3] Corruccini RS, Townsend GC, Richards LC, et al. Genetic and environmental determinants of dental occlusal variation in twins of different nationalities. Hum Biol. 1990;62(3):353–367.

[4] Lombardo G, Vena F, Negri P, et al. Worldwide prevalence of malocclusion in the different stages of dentition: a systematic review and meta-analysis. Eur J Paediatr Dent. 2020;21(2):115–122. DOI:10.23804/ejpd.2020.21.02.05.

[5] Larsen CS. Biological changes in human populations with agriculture. Ann Rev Anthropol. 1195;24(1):185–213.

[6] Manzella K, Franchi L, Al-Jewair T. Correction of maxillary transverse deficiency in growing patients with permanent dentitions. J Clin Orthod. 2018;52(3):148–156.

[7] Barnes RE. The early expansion of deciduous arches and its effect on the developing permanent dentition. Am J Orthod. 1956;42(2):83–97.

[8] Bishara SE, Hoppens BJ, Jakobsen JR, et al. Changes in the molar relationship between the deciduous and

permanent dentitions: a longitudinal study. Am J Orthod Dentofacial Orthop. 1988;93(1):19–28.
[9] Baccetti T, Franchi L, McNamara AJ Jr, et al. Early dentofacial features of Class II malocclusion: a longitudinal study from the deciduous through the mixed dentition. Am J Orthod Dentofacial Orthop. 1997;111(5):502–509.
[10] Adenoids L-AS. Their effect on mode of breathing and nasal airflow and their relationship to characteristics of the facial skeleton and the dentition. A biometric, rhino-manometric and cephalometro-radiographic study on children with and without adenoids. Acta Otolaryngol Suppl. 1970;265:1–132.
[11] McDonnell JP, Needleman HL, Charchut S, et al. The relationship between dental overbite and eustachian tube dysfunction. Laryngoscope. 2001;111(2):310–316. DOI:10.1097/00005537-200102000-00023.
[12] Galeotti AFP, Festa P Viarani V, et al. Prevalence of malocclusion in children with obstructive sleep apnoea. Orthod Craniofac Res. 2018;21(4):242–247.
[13] Fernandez-Mendoza J, He F, Calhoun SL, et al. Association of pediatric obstructive sleep apnea with elevated blood pressure and orthostatic hypertension in adolescence. JAMA Cardiol. 2021;6(10):1144–1151.
[14] Urbano GL, Tablizo BJ, Moufarrej Y, et al. The link between pediatric obstructive sleep apnea (OSA) and attention deficit hyperactivity disorder (ADHD). Children (Basel). 2021;8(9):824.
[15] Tamasas B, Nelson T, Chen M. Oral health and oral health-related quality of life in children with obstructive sleep apnea. J Clin Sleep Med. 2019;15(3):445–452.
[16] Yoon A, Abdelwahab M, Bockow R, et al. Impact of rapid palatal expansion on the size of adenoids and tonsils in children. Sleep Med. In Press; 2022. DOI:10.1016/j.sleep.2022.02.011.
[17] Fagundes NCF, Rabello NM, Maia LC, et al. Can rapid maxillary expansion cause auditory improvement in children and adolescents with hearing loss? A systematic review. Angle Orthod. 2017;87(6):886–896.
[18] Barnes RE. The early expansion of deciduous arches and its effect on the developing permanent dentition. Am J Orthod. 1956;42(2):83–97. https://doi.org/10.1016/0002- 9416(56)90069-0
[19] Singleton LG. The human side of orthodontia. Angle Orthod. 1934;4(4):305–311.
[20] American Association of Orthodontists. [Internet]. Your child's first orthodontic check-up. 2015. [cited 2022 Mar 8]. Available from: https://www.aaoinfo.org/Wp-Content/Uploads/2018/07/Your_Childs_First_Checkup-15-Cons-Hl.pdf
[21] American Dental Association. [Internet] Accreditation standards for advanced dental education programs in orthodontics and dentofacial orthopedics. 2021. [cited 2022 Mar 2]. Available from: https://coda.ada.org/~/media/CODA/Files/2022_ortho.pdf?la=en
[22] Sheats R. Pediatric dental sleep medicine: the ADA children's airway conference. J Dent Sleep Med. 2018;5(4):107–108.
[23] AAPD. 2021. [Internet]. Policy on Obstructive Sleep Apnea. Policy on Obstructive Sleep Apnea (OSA). [cited 2022 Mar 1]. Available from: https://www.aapd.org/research/oral-health-policies–recommendations/obstructive-sleep-apnea/

Kevin L. Boyd DDS, MSc
Clinical Instructor, Department of Dentistry, Consultant, Pediatric Sleep Center, Lurie Children's Hospital, Dentistry for Children, Private Practice, Chicago, IL USA
kbo569@gmail.com

Steve Carstensen DDS
Private Practice, Bellevue, WA, USA Clinical Assistant Professor, Louisiana State University, School of Dentistry, New Orleans, LA, USA
seattlesleeped@gmail.com