

Breathing Under Wraps: Obstructive Sleep Apnea in Children - Pediatric Dentist's Role

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Abstract

Obstructive Sleep Apnea (OSA) is a common sleep-related breathing disorder linked to specific malocclusions and craniofacial features. Pediatric dental practitioner plays a significant role in diagnosing clinical presentation and risk factors associated with pediatric OSA and providing comprehensive, preventive and therapeutic treatment strategies in managing these children in collaboration with multispecialty. The aim of this research paper is to provide a brief insight about OSA in children regarding its etiology, clinical presentation and management and also to alert all pediatric dentists and general dental professionals in enhancing their knowledge about OSA, the more common sleep related disorder.

Keywords: American Academy of Pediatric Dentistry; Dental Professionals; Obstructive Sleep Apnea (OSA); Pediatric Patients; Sleep-Disorders

Introduction

Various orofacial obstructions are encountered in children comprising of interprofessional collaborative diagnostic and therapeutic communication among various specialties in medicine and Dentistry such as dentists, pediatricians, surgeons and sleep specialists [1]. Pediatric Dentistry is an art and science of dentistry dealing with children addressing various domains related to oral and dental structure. Among different ailments, obstructive sleep apnea (OSA) is referred to a 'condition characterized by partial or complete obstruction of the upper airway leading to disrupted respiratory and ventilatory patterns during sleep.' The reported prevalence of OSA in pediatric population ranges from 1 to 4% and is a significant risk factor for development of OSA occurring in adolescent group [2].

Presence of OSA in children is associated with various clinical changes ranging from cognitive changes, emotional imbalance, growth irregularity, cardiovascular changes, neurological issues and behaviour issues [3]. It is a clinically undiagnosed serious sleep disorder disturbing children's overall growth. Most of the time, OSA, is caused by airway obstructions extending from the nose to the larynx mainly related to craniofacial malformations, neuromuscular disorders and prematurity in neonates [4]. Therefore, pediatric dentist is a holistic

health care professional in identifying risk factors in children associated with OSA in order to provide multidisciplinary care. The aim this short communication is to provide a brief insight about pediatric dentist role in managing children with OSA.

Discussion

Obstructive Sleep Apnea is associated with both short-term and long-term complications including endothelial, metabolic and cardiovascular disorders. As a result, not only pediatric dentist but also other dental health care and medical health care professionals should have enough knowledge about risk factors, clinical presentation, clinical parameters/findings, other associated conditions, pathophysiology, complications arising from, diagnostic protocol and management of OSA in children [5]. Recently American Academy of Pediatric Dentistry has proposed a policy statement for all health care professionals about management of OSA in children [2]. They are 1. Screening of patients for sleep-related breathing disorders such as OSA and primary snoring. 2. Evaluation of tongue position as it may contribute to obstruction. 3. Evaluate the tonsillar pillar area for hypertrophy. 4. Recognition of obesity as a contributing factor to OSA. 4. Recognizing craniofacial anomalies associated with OSA. 5. Referring to an appropriate medical professional like otolaryngologist, sleep medicine physician, pulmonologist for diagnosis and treatment of any patient suspected of having OSA. 6. Consider non-surgical intraoral appliances only after a complete craniofacial/orthodontic assessment of the patient's growth and development as part of a multidisciplinary approach [2]. Hence every pediatric dentist should follow these policy guidelines during their clinical practice for identifying hidden OSA in children.

The predisposing risk factors and clinical findings of OSA varies in each age group. Association of OSA with asthma and hepatic steatosis in children and adolescents has been reported [5]. Children suffering from attention deficit hyperactivity disorder, neuromuscular disorders, cerebral palsy, craniofacial anomalies and Down syndrome/Trisomy 21 are considered as high-risk group for developing OSA [6]. Clinically children with OSA exhibit compromised airway both structurally and functional. OSA can affect all children from birth until adulthood. Compared to adults, neonates show distinctive anatomic and physiologic features that predispose them to have OSA [7]. Presence of adenoid or tonsillar hypertrophy is the main etiological feature for OSA in children, followed by allergic rhinitis, asthma and malocclusion. Therefore, pediatric dentist is a prime person in identifying signs of OSA such as mouth breathing, retrognathic mandible, narrow, high arch palate and dental malocclusion.

Pediatric dentist has a magnificent role in screening and early detection, medical referral and in providing multidisciplinary care. In screening and early detection, pediatric dentist should ask specific questions about mouth breathing, daytime sleepiness, morning headaches and incidence of snoring [8]. The American Academy of Pediatric Dentistry encourages pediatric dentists to refer high-risk patients for evaluation of sleep pattern and diagnosis by different specialists. Being an essential part of the multidisciplinary care team, pediatric dentist should work with physicians, surgeons and other specialists for a successful result [9]. Using orthodontic devices like rapid maxillary expansion pediatric dentist can expand the palate to increase the diameter of the upper airways, which can enhance the symptoms of mild to moderate OSA [10]. In some patients using mandibular advancement appliances pediatric dentist can reposition the lower jaw forwardly to increase the upper airway space and airflow during sleep. In instances, where dental appliances are ineffective, procedures like mandibular distraction osteogenesis can be used to widen the jaw bones to create more airway space. Patients having different malocclusion most of the time are associated with chronic mouth breathing, hence dental malocclusion like class II malocclusion, vertical facial growth and maxillary transversal deficiency should be corrected to improve the overall airway [11].

Diagnostic protocol for OSA includes comprehensive sleep history and thorough physical examination to screen for OSA in children. However, there is sensitivity and specificity related factors that should be ruled out during diagnosis. In-laboratory polysomnography (PSG) remains the gold standard for diagnosing pediatric sleep-disordered breathing. However, there are disadvantages found with polysomnography such as the specialized training involved in studying children, the laborious nature of the test, economic/social barriers

delaying diagnosis and treatment and limited access to a sleep center. There are new emerging tools attempted to fasten the timely diagnosis of pediatric OSA such as biomarkers, endoscopy and upper airway imaging [3-6].

One cross-sectional multicenter study explored that socioeconomic factors are associated with both occurrence and severity of OSA in children [4]. Hence, screening of socioeconomic factors should be incorporated in the diagnostic process of OSA in children to provide meticulous intervention and patient-centered care. Another cross-sectional study demonstrated that obese children or overweight children and adolescents exhibited significantly increased OSA related risk factors and showed parental or self-report of loud snoring [4]. A recent systematic and meta-analysis provided evidence supporting the association between ankyloglossia and obstructive sleep apnea in children [6]. Authors suggested that short lingual frenulum is a risk factor for pediatric OSA. A short lingual frenum can contribute to abnormal orofacial development, leading to increased upper airway resistance and susceptibility to upper airway collapsibility during sleep [6]. Therefore, as pediatric dentist is a first health care professional who see children right from birth, timely diagnosis of short lingual frenulum by a pediatric dentist is highly essential for early intervention and early referral to a concerned specialty.

Numerous treatment approaches have been suggested for the treatment of OSA in children. They are myofunctional therapy, adenotonsillectomy, positive airway pressure devices, mandibular advancement appliances and rapid maxillary expansion [1]. An umbrella review concluded from their results that mandibular advancement appliances should be considered as a part of the multidisciplinary treatment for OSA in children [5]. Yoon et al [8] evaluated the changes in adenoid and palatine tonsil sizes following rapid maxillary expansion using 3D volumetric analysis of cone beam computational tomography imaging. Results of the study indicated that rapid maxillary expansion significantly reduced the size of both adenoid and palatine tonsils and suggested another long-term benefit of rapid maxillary expansion treatment [8].

A remarkable advancement has been happened in the management of OSA. Emerging technology including a portable, easy to use, robust, accessible, easy to use and with great validity has been developed not only to screen but also to diagnose OSA and other sleep related disorders. Other cutting-edge technology like machine learning, artificial intelligence, wearable technology for diagnosis, robotic surgery has been progressing in rocket speed [6].

Conclusion

Pediatric dentist plays a significant role in diagnosing and managing OSA in pediatric patients during routine dental practice. A multi-disciplinary approach including various specialties like pediatricians, surgeons, physicians and sleep therapists is essential for the successful management of OSA. As pediatric dentist deals with children more frequently than other health care professional, he can help in screening signs and symptoms of sleep-disordered breathing and obstructive sleep apnea.

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