THE ROLE OF AN INTERDISCIPLINARY APPROACH IN THE PRESENCE OF MULTIPLE TOOTH DECAY AND MOUTH BREATHING: A CASE REPORT

Sirma Angelova, Dobrinka Damyanova

Department of Pediatric Dental Medicine, Faculty of Dental Medicine, Medical University of Varna, Bulgaria

ABSTRACT

Today, the overall distribution and severity of tooth decay among children are increasing at considerable rates. In addition to the main etiological factors, orthodontic status and harmful habits also impact caries risk levels. Mouth breathing, related to open bite, significantly enhances the predisposition of teeth to the initiation and progression of caries and periodontal disorders. The purpose of this study is to evaluate oral health status under conditions of mouth breathing, focusing on the role of an interdisciplinary healthcare approach.

A 9-year-old female with a history of diagnosed adenoid hypertrophy, staying and sleeping predominantly with an open mouth, was examined. The assessment of oral health status was based on epidemiological indices of caries, as well as conventional clinical indicators such as PLI, GI, PBI, and criteria for evaluating deviations from orthognathic occlusion. Caries risk levels were also assessed using a questionnaire.

A caries-non-resistant mixed dentition with a considerable number of active non-cavitated, cavitated, and complicated carious lesions was identified. The patient was diagnosed with generalized moderate plaque-induced gingivitis. Anamnestic data indicated uncontrolled sugar intake, unsatisfactory oral hygiene, and irregular dental visits, corresponding to a definitively high caries risk.

The common health condition of adenoid hypertrophy necessitates consultation with a specialist in otorhinolaryngology. The associated symptom of mouth breathing requires collaboration with an orthodontist to improve oral health status and, consequently, the quality of life.

Keywords: *mouth breathing, oral health, childhood, otorhinolaryngologist, collaboration*

INTRODUCTION

The implementation of a great variety of tools of primary dental prophylaxis can ensure a significant reduction of the risk of initiation and clinical manifestation of oral diseases. At the same time, the efficient treatment of oral disorders in their early stages, based on the principles of secondary prophylaxis, is of great importance at both the individual and societal levels. Although there are plenty of opportunities for multifaceted preventive and prophylactic activities across different periods of childhood and adulthood, we cannot confirm a significant improvement in oral health over the last 30 years.

Today, according to data by the World Health Organization (WHO), there are recorded approximately 2.5 billion people all over the world with clinical findings of untreated tooth decay, accounting for 30.86% of the global population. Nowadays the severe forms of tooth decay among certain age groups in childhood are increasing at a considerable rate. Approximately 50% of primary and permanent teeth in children worldwide are affected by the carious process. In addition to the main etiological factors for caries—enamel quality, cariogenic microorganisms, and frequent sugar intake—harmful habits and orthodontic disorders also impact caries risk. Mouth breathing, related to malocclusion of open bite, increases the predisposition of teeth to the onset and progression of tooth decay. Almost 1 billion people have severe disorders of the supporting dental structures, and about 350 million people worldwide suffer from total tooth loss.

Currently, 134 out of the 194 WHO member countries report clinical cases where more than 40% of all deciduous teeth in individuals with primary and mixed dentition are affected by carious lesions. The prevalence of tooth decay in primary teeth ranges from 46% in low- and middle-income countries to 38% in high-income countries. The worldwide incidence of caries in permanent teeth has increased by approximately 640 million cases for a period of 3 decades (from 1990 to 2020), with the lowest increase registered in the European countries (1,2,3,4).

According to the American Academy of Pediatric Dentistry, the most essential variables and indicators related to caries risk assessment include: the qualitative and quantitative characteristics of enamel

(including zones of enamel demineralization), plaque accumulation, inflammation of gingival tissues, the presence of cariogenic microorganisms such as Streptococcus mutans and Streptococcus sobrinus, frequency of fermentable carbohydrate intake, timing, saliva composition (organic and inorganic components), overall health status, medication use, oral hygiene products and practices, fluoride prophylaxis (both endogenous and exogenous), healthcare-related behaviors and cultural factors, dietary habits, frequency of individual and family dental visits, and socioeconomic background. The complexity of these factors necessitates the use of an interdisciplinary approach for the effective management of multifocal carious lesions (5).

Among the common health disorders with a direct and indirect impact to oral cavity tissues and structures is the adenoid hypertrophy. Tonsils are located in the oral and nasal cavities and are part of the human immune system. In the nasal-pharengyal zone is sitiuated the third tonsil. As individuals age, immune cell infiltration causes the tonsil to enlarge, leading to adenoid hypertrophy. This condition can result in obstruction of the nasal choanae, causing a disruption in the physiologically based nasal breathing Persistent adenoid hypertrophy poses a significant risk of partial or complete obstruction of the nasal pathway. That pathological condition of adenoid hypertrophy can cause disturbance of the normal growth and development of the orofacial region, clinically manifesting as the so-called adenoid facies. Adenoid hypertrophy is characterized by specific symptoms: inspiratory dyspnea and open-mouth breathing, febrility, rhinorrhea, snoring, sneezing, earache, and dysphonia (Table 1) (6-17).

Medicines associated with the management of various symptoms include antibiotics, antihistamines, nasal decongestants, and (nasal) corticosteroids. The combined effects of mouth breathing and medication intake contribute to xerostomia (dry mouth). All of these factors have numerous detrimental impacts on oral cavity tissues and functionality (18,19,20).

AIM

The aim of this study is to assess the oral status in the context of mouth breathing, focusing on the role of an interdisciplinary healthcare approach.

CASE REPORT

This case concerns a 9-year-old female. A declaration of informed consent and an inquiry form were completed and signed by her parent. The girl exhibits normal physical and neuro-psychological development. The condition of mixed dentition corresponds to her chronological age. There is no family history of genetic or systemic diseases, or previous allergic reactions. The child has been diagnosed with adenoid hypertrophy and has the harmful habit of staying and sleeping with her mouth open, leading to mouth breathing.

To evaluate the oral status, we implemented the epidemiological indices of dft/DMFT, as well as conventional clinical indicators such as the Plaque Index (Silness-Löe), Gingival Index (Löe-Silness), and the Papillary Bleeding Index (Saxer & Mühlemann). We also used a questionnaire to record dietary habits, oral hygiene practices (including the use of age-appropriate oral hygiene products), frequency of dental visits, and harmful habits. Taking into consideration the main orthodontic criteria for interjaw relations, we established the presence of deviation from orthognathic occlusion (21). We used the Caries Risk Assessment Tool developed by the American Academy of Pediatric Dentistry for infants, children, and adolescents (5).

Based on anamnestic data from the parent, the child frequently consumes sugar-containing foods and drinks. She often skips evening tooth brushing. She does not use any additional oral hygiene products appropriate for her age and dentition type, with sporadic use of fluoride toothpaste and a preference for homeopathic products. The girl has visited dentists only in emergencies, without regular prophylactic check-ups prior to this study.

We recorded a clinical case of caries-prone mixed dentition with a considerable number of active non-cavitated, cavitated, and complicated cari-

Table. 1. Adenoid hypertrophy-associated pathological conditions

Adenoid hypertrophy			
Mouth breathing		**Obstructive sleep apnea**	**Asthma**
Increased risk of tooth decay Enhanced predisposition to periodontal disorders	Abnormal swallowing	Pathological alterations in the head and neck region; Cranial-facial deformities	Pathological alterations of the posture of the body

ous lesions (dft = 100%, DMFT = 66.67%). Eight of the 12 deciduous teeth present are affected by carious lesions: teeth 55, 65, 75, and 85 have deep and extensive cavity lesions, identified diagnostically as Closed Asymptomatic Pulpitis. All primary canines (teeth 53, 63, 73, and 83) exhibit diffuse, non-cavitated, active carious lesions on their vestibular surfaces, covered by a significant amount of dental plaque. The upper and lower first primary molars (teeth 54, 64, 74, and 84) were endodontically treated and filled. Eight of the 12 erupted permanent teeth are also affected by caries. All first permanent molars (teeth 16, 26, 36, and 46) have cavitated lesions on their occlusal surfaces. On the vestibular surfaces of the upper central and lateral incisors (dentes 12, 11, 21 and 22) were identified non-cavitated carious lesions of active demineralization.

We calculated PLI = 2.17 and GI = 1.92 based on the representative teeth: 16, 22, 64, 36, 42, and 84. According to the percentage ratio of bleeding papillae to the total number of evaluated papillae, we obtained a PBI value of >30%. Taking into account these clinical indices, the subject was diagnosed with generalized moderate plaque-induced gingivitis.

Based on the criteria related to the assessment of orthognathic occlusion and, respectively, deviations from the norm, an orthodontist identified an open bite associated with the harmful habit of mouth breathing. A specialist in otorhinolaryngology consulted the child regarding the diagnosed pathological condition of adenoid hypertrophy, which was causing the mouth breathing.

DISCUSSION

Based on literature sources, the rates of mouth breathing among children vary from 5% to 75% of the examined subjects. Researchers emphasize two main causes for this pathological condition: allergic rhinitis and adenoid hypertrophy. In addition to being associated with medical conditions that disturb physical and learning capacities, mouth breathing is also linked to oral disorders, including malocclusion. Studies have shown that mouth breathing, synergistically related to xerostomia, leads to a decrease in salivary pH, increased acidity in the oral cavity, greater plaque accumulation, and enhanced activity of the highly cariogenic Streptococcus mutans microorganisms. Other investigations also focus on the role of mouth breathing as a considerable predisposing factor for carious destruction of teeth (5,8,22).

Some scientists also explore the role of mouth breathing as a major contributor to the onset and progression of periodontal disorders, including gingivitis. The inflammation of gingival tissues correlates with the quantitative and qualitative characteristics of dental plaque, which is described as a heterogeneous community of aerobic and anaerobic microorganisms embedded in an intercellular matrix with pathogenic potential (22,23,24,25,26). A pathological condition of anterior dental open bite can develop as a consequence of prolonged mouth breathing. This deviation from orthodontic norms increases the risk of diseases of the supporting apparatus, with the clinical manifestation of early-stage frontal tooth loss. The diagnosed periodontal condition of generalized moderate plaque-induced gingivitis in our clinical case corresponds to findings of other researchers (22,23,24,25,26).

It is of great importance to combine and coordinate the professional expertise and efforts of specialists in Pedodontics, Orthodontics, Otorhinolaryngology, and Pediatrics, who are involved in dealing with both the oral and common health-related disorders concerning this clinical case. Given that mouth breathing is one of the most frequent harmful habits related to the oral cavity, dentists must be knowledgeable about its psychological and pathophysiological aspects for long-term management (22,23,24,25,26).

Pediatric dentists, in collaboration with public dentists and otorhinolaryngologists, must organize and implement screening and comprehensive treatment for pediatric patients with diagnosed upper airway obstruction and mouth breathing, following preventive and prophylactic principles within an interdisciplinary approach (26,27,28). Mouth breathing is identified as a respiratory dysfunction widely prevalent among children, especially those aged between 6 and 11 years (28,29,30). The subject of this study falls within this age group, and her compromised oral health is consistent with the evidence provided by other authors regarding the detrimental effects of mouth breathing on oral status (25,31,32).

Other researchers also emphasize the role of dentists in collaboration with other oral and general health professionals for proper, timely diagnostic and therapeutic procedures in order to prevent complications affecting dental, periodontal, and facial structures, as well as systemic health, under conditions of established airway dysfunction, such as mouth breathing (33,34). Our results confirm the findings of other researchers regarding mouth breathing-related xerostomia, which results in a significantly increased risk and predisposition to tooth decay and periodontal disorders.

Mouth breathing directly impacts dental health by reducing saliva production and, as a consequence, drying out oral tissues and organs. Deprived of saliva and its protective components, hard tooth tis-

sues and periodontal structures become susceptible to significant destructive and inflammatory effects. Mouth breathing, especially during sleep, causes a reduction in oral pH levels, leading to an increased susceptibility to caries (25,26,27,28,29,35,36,37) (Diagram 1).

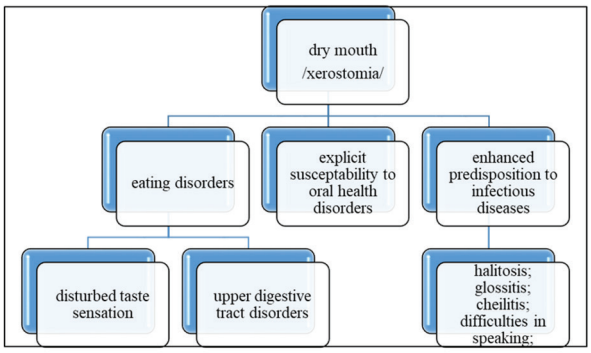

Diagram 1. Dry mouth-related pathological conditions

CONCLUSION

The established adenoid hypertrophy determines the need of a consultation with a specialist in the scope of otorhinolaryngology. The accompanying symptom of mouth breathing, especially in the context of an open bite, requires collaboration with an orthodontist. The contribution and combined efforts of pedodontists, pediatricians, orthodontists and otorhynolarhyngologists ensure improvement in the quality of life of the child.

Address for correspondence:
Assoc. Prof. Sirma Todorova Angelova, DMD, PhD
Department of Pediatric Dental Medicine
Faculty of Dental Medicine
Medical University of Varna
Address: 9000 Varna
84 Tsar Osvoboditel, Blvd.
e-mail: sirma.angelova@mu-varna.bg

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