OPEN MOUTH, CLOSED HEALTH: AN EXTENSIVE REVIEW ON MOUTH BREATHING AND ITS EFFECTS ON OVERALL WELLNESS

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Abstract

Mouth breathing stands out as a prevalent detrimental oral behavior among children, frequently stemming from an obstruction in the upper airway. This leads to a partial or complete diversion of air through the oral cavity. The repercussions of mouth breathing span across various bodily domains, encompassing oral health, craniofacial growth, as well as the upper and lower airways. It contributes to a vertical facial growth pattern, constriction of the upper jaw, parched oral conditions leading to gingivitis around the upper front teeth, protrusion of these teeth, and an inability to close the lips properly. This cluster of facial characteristics is often termed adenoid faces.

Keywords: - Mouth Breathing, Airway Obstruction, Craniofacial Development, Adenoid Faces

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INTRODUCTION

Breathing through the mouth is a widespread detrimental oral habit found in children and often indicates sleep-disordered breathing (SDB). Its occurrence rates vary between 11% and 56% among children [1-4]. Like other unfavorable oral habits such as irregular biting, tongue positioning, chewing, and sleeping behaviors, mouth breathing might naturally diminish as children age [5]. Continued mouth breathing poses a risk to children's dental and facial development. The issue starts with a shift in the natural position of the tongue, which should rest on the roof of the mouth. Instead, it descends to the floor of the mouth, leading to insufficient skeletal growth and the onset of what's known as "long face syndrome" [6]. This habit significantly impacts the growth of the facial skeleton and the alignment of teeth due to the displacement of normal lateral, buccal, and lingual muscular forces [7]. Some individuals might seem like mouth breathers due to their mandibular posture or inadequate lip closure. In cases of mouth breathing, there's a reduction in carbon dioxide levels in the lungs and blood, resulting in decreased oxygen supply to the body's cells [8]. At three years old, signs of oral respiration, a lowered tongue posture, and increased lower anterior facial height might start becoming noticeable, but they are typically more frequently identified after the age of five [9].

Chronic nasal blockage can lead to mouth breathing due to reduced airflow through the nose. While nasal obstruction itself doesn't solely cause obstructive sleep apnea (OSA), it's often linked with mouth breathing during sleep. Treating nasal congestion can consequently improve mouth breathing, enhance sleep quality, and promote compliance with nasal continuous positive airway pressure (CPAP) therapy [10]. The effects of mouth breathing are evident on facial features, including a small, short nose with straight wings, pale and low cheeks, constant mouth opening, a shortened upper lip, and an underdeveloped jaw that's often set farther back and shorter than average due to imbalanced muscular pressures [11]. Public dentists and pediatric dentists are well-placed to screen and manage patients dealing with upper airway obstruction or mouth breathing. Dentists typically conduct regular check-ups every six months, allowing them to easily spot inflamed tonsils by using a mirror to view the back of the patient's throat. Screening for upper airway obstruction should encompass patients of all ages—children, teenagers, and adults [11,12]. Addressing mouth breathing often requires a collaborative effort involving pediatricians, physicians, dentists, and ear, nose, and throat specialists (otolaryngologists or ENTs) [13].

Mouth breathing, a respiratory condition prevalent among a significant portion of the general population, affects individuals across various age groups—children, adolescents, and even adults. It's known to trigger both localized and systemic pathological effects, impacting individuals in both the short and long term [14]. The term "adenoid facies," coined by C. V. Tomes in 1872, highlighted the distinctive dentofacial appearance observed in individuals facing nasal breathing difficulties. This condition leads to characteristic features such as a lengthened and narrowed face, open bite, an upward growth pattern, forward-positioned upper incisors, increased lower facial height, a more pronounced angle of the mandibular plane, downward positioning of the chin, and a greater gonial angle [15]. Studies conducted by Kingsley in 1889 suggested that children experiencing severe nasal breathing difficulties displayed normal skeletal formation and development [16]. Chacker described nasal breathing difficulties as prolonged exposure of the facial tissues to the drying effect caused by inhaled air [17]. Sassouni defined mouth breathing as a habitual reliance on breathing through the mouth rather than the nose.Merle proposed the term "oronasal breathing" instead of "oral" or "mouth" breathing, considering it a more accurate description [18].

Presently, the perspective is that mouth breathers consistently rely on breathing through the mouth even during periods of rest. It's important to differentiate them from nasal breathers, who only resort to mouth breathing during intense physical exertion, otherwise preferring nasal breathing during restful states [19] .Mouth breathing has a complex array of causes. One of the most prevalent reasons is nasal obstruction, which can stem from various factors—both congenital and acquired after birth. Nasal obstruction heightens the resistance to airflow, potentially disrupting sucking and swallowing reflexes. This disruption increases the likelihood of aspiration or can lead to more severe respiratory distress conditions. Furthermore, nasal obstruction disrupts the normal flow of sensory information to the olfactory brain, impacting the trophic (nourishing) aspects of this sensory pathway [20]. Enlarged turbinates , often influenced by allergies, chronic mucous membrane infections, atrophic rhinitis, hot and dry climates, or exposure to polluted air, can impede normal

breathing. Intranasal defects, including a deviated nasal septum, septal subluxation, thickened septum, bony spurs, and nasal polyps, disrupt airflow within the nasal passages. Persistent bacterial infections and toxins may sensitize tissues, triggering allergic reactions in cases of allergic rhinitis. Additionally, repeated infections leading to the hypertrophy of pharyngeal lymphoid tissue (adenoids) can block the posterior nasal passages, compelling individuals to resort to mouth breathing for respiration [10-14].

DIAGNOSIS

To accurately diagnose the breathing pattern and distinguish between nasal breathing difficulties and habitual mouth breathing during sleep or rest, clinical and functional tests are employed. Several diagnostic tests help confirm mouth breathing:

1. **Mirror Test (Fog Test):** Using a double-sided mirror positioned between the nose and mouth, fogging on the mirror's nasal side indicates nasal breathing, while fogging on the oral side indicates mouth breathing [21].

2. **Masslers Water Holding Test**: Patients are instructed to hold water in their mouths. Mouth breathers typically struggle to retain the water for an extended period [22].

3. **Massler and Zwemer Butterfly/Cotton Test**: Butterfly-shaped cotton strands placed below the nostrils. During exhalation, if the fibers flutter downwards, the patient is a nasal breather; if upwards, the patient is a mouth breather [23].

4. **Inductive Plethysmography (Rhinometry):** This method quantifies total airflow through the nose and mouth, allowing for precise calculation of the percentage of nasal versus oral respiration. It involves devices like flow meters and pressure gauges. In long-faced children, less than 40% nasal breathing was observed in a minority [24].

5. **Cephalometrics**: Utilized to assess the nasopharyngeal space, adenoid size, and the patient's skeletal patterns by measuring various cephalometric angles. These tests aid in understanding the anatomical and structural aspects related to breathing patterns [25].

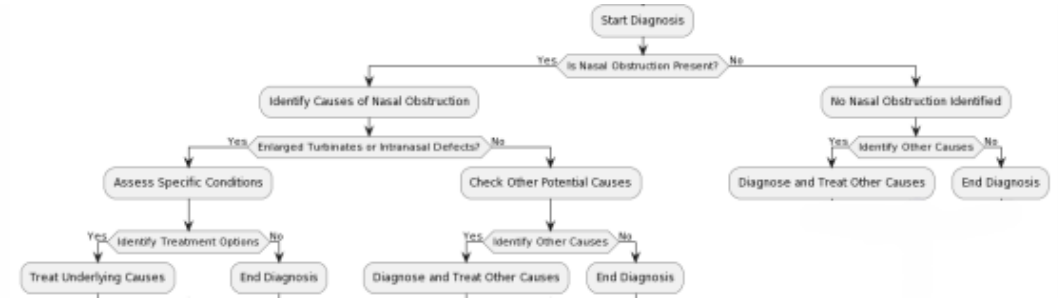

Figure 1: Diagnosis of Mouth Breathing

TREATMENT

Treatment for mouth breathers typically involves addressing multiple factors and can be categorized based on the symptoms observed:

1. **Removing the Cause**: Prioritize treating the underlying causes. Surgical intervention or local medications can address nasal or pharyngeal obstructions. If respiratory allergies contribute to the issue, managing and controlling these allergies becomes essential. Techniques like rapid maxillary expansion have shown promise in reducing associated problems [20-23].

2. **Intervening with the Habit:** Correcting the habit of mouth breathing might be necessary

even after removing the obstruction. Various methods are used for correction:

(A). **Exercises:** Various exercises during the day and night can help retrain breathing habits. These include holding objects between the lips, specific lip stretching exercises for patients with specific lip conditions, button pull exercises, tug of war exercises, and specific lip-tension exercises [26].

(B) **Maxillothorax Myotherapy**: A method proposed by Macaray in 1960 involving expanding exercises alongside the use of an activator. This technique aims to correct dental arches and base relationships while addressing mouth breathing. Exercises are performed with the activator in the mouth along with specific arm movements several times a day [27].

(C). **Oral Screen:** Introduced by Newell in 1912,

this myofunctional appliance is easy to fabricate and wear. It serves as a therapeutic device to aid in correcting mouth breathing habits [28].

These treatments focus on a combination of habit interception, exercises, and appliances to correct mouth breathing habits and alleviate associated symptoms**.**

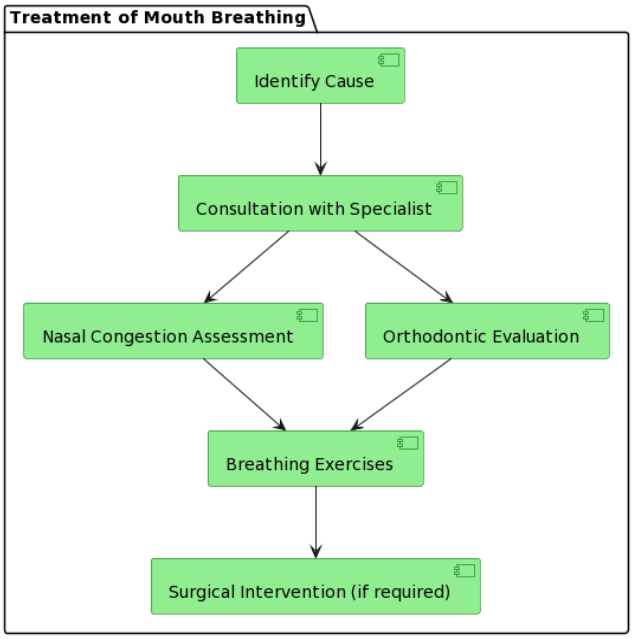

Figure 2: Treatment of Mouth Breathing

The integration of the metaverse offers mouth breathing patients avenues for enhanced care, including virtual therapy sessions, remote healthcare consultations, supportive communities, tailored training environments, and opportunities for innovative research, ultimately elevating their management and comprehension of the condition [29].

CONCLUSION

The prevalence of mouth breathing among children persists despite advancements in medicine and early diagnostic tools. It's become a significant concern, but parental awareness and understanding of normal developmental stages for their child's age can greatly assist in addressing this issue. When mouth breathing leads to malocclusion or other pathological conditions, it becomes crucial for dentists to collaborate with both the child and parents to find effective solutions and provide timely dental care. Clinical symptoms vary in severity based on the duration of mouth breathing. Without intervention, developmental deficiencies worsen, leading to more pronounced structural changes in the body. Mouth breathing doesn't just affect facial development but also impacts alignment, function, and overall body growth. Common diagnoses include anterior open bite, increased overjet, a backward positioning of the lower jaw, a narrowed upper jaw, and heightened lower facial third. Addressing this issue early can significantly impact a child's overall health and development.

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