

Airway Dentistry And Periodontal Health - A Review**Dr. Amrita Das¹, Dr. Snehal Labhshetwar², Dr. Khushbu Deshmukh³, Dr. Bhakti Gokani⁴**¹Senior Lecturer, ^{2,3}Reader, Department of Periodontology, Saraswati Dhanwantari Dental College & Hospital, Parbhani, ⁴General Dentist, Bhakti Maxillofacial and Implant Centre, Ahmedabad, Nikol.

Abstract - the airway encompasses of the mouth, jaw, nasal passage, tongue and throat. Dentists in collaboration with other health professionals can recognize the early signs and symptoms of disorder and facial and craniofacial deformities and can provide the treatment for the treatment and management of dysfunctions. Therefore it is of interest to discuss the impact of airway development and dysfunction of dental health. The intersection of airway dentistry and periodontal health is an emerging field of study that recognizes the interconnectedness of oral and systemic health.

Keywords -airway health, periodontal health, obstructive sleep apnea , Chronic obstructive sleep apnea (COPD), Asthma

INTRODUCTION -

The intersection of airway dentistry and periodontal health is an emerging field of study. airway dentistry focuses on the structure and function of airway, plays a crucial role in diagnosing and managing conditions such as obstructive sleep apnea (OSA). Periodontal health, concerning the gums and supporting structures of the teeth, is integral to overall oral health. This review explores on how these two areas intersect, highlighting the implications for dental practise and patient. Beyond the dental implications, upper airway obstructions can lead to sleep disturbed breathing which causes headaches, snoring, difficulty sleeping, neck, jaw, or ear pain. Chronic diseases such as obesity, ADHD, asthma, anxiety, Alzheimer's, type II diabetes, cardiovascular disease and sleep apnea develop from sleep disturbed breathing and thus affect the quality of life and life expectancy. ¹

AIRWAY DENTISTRY :-AN OVERVIEW :-

Airway dentistry is dedicated to identifying and treating issues related to the airway, which can significantly affect breathing during sleep. ²

Common conditions addressed include:-**Obstructive sleep Apnea :-**

A condition where the airway collapses during sleep, leading to intermittent breathing pauses.

Upper Airway Resistance Syndrome:- (UARS):- less severe than OSA , Characterised by airflow limitations that causes disrupted sleep.

Dental professionals play a vital role in identifying these conditions through screening and collaboration with sleep medicines specialists. Treatment options often include oral appliances designed to keep the airway open during sleep, thereby improving breathing and sleep quality. ³

PERIODONTAL HEALTH :AN OVERVIEW :-

Periodontal health focuses on the prevention, diagnosis and treatment of diseases And affecting the gums and supporting structures of the teeth.

Gingivitis :- inflammation of the gums, often reversible with proper care .

Periodontitis - A more severe form of gum disease that can lead to tooth loss and has been linked to systemic conditions like diabetes and cardiovascular diseases. Maintaining periodontal health requires regular dental check ups, proper oral hygiene and in some cases professional interventions such as scaling and root planning.

The connection between airway dentistry and periodontal health is multifaceted, with implications for both diagnosis and treatment. several key points illustrate their relationship:- ³

Inflammatory pathways - chronic inflammation is a common factor in both periodontal disease and airway conditions like OSA. Periodontal disease can exacerbate systemic inflammation, which in turn may worsen airway health and vice versa. For instance systemic inflammation from periodontal disease can lead to increased inflammatory markers that may contribute to airway collapse. ⁴

Bruxism and Sleep Disordered breathing -

Bruxism, or teeth grinding is often associated with sleep disordered breathing. It can lead to periodontal damage and is sometimes considered a marker for underlying airway issues. Addressing sleep disordered breathing may help mitigate bruxism and its periodontal consequences. ⁵

Periodontal health :-

Periodontal health pertains to the gums, periodontal ligaments and alveolar bone that supports the teeth. Common periodontal diseases includes gingivitis and periodontitis, characterized by inflammation and in severe cases, destruction of the supporting tissues. ⁵

Periodontal diseases are not only a leading cause of tooth loss but are associated with systemic conditions such as diabetes, cardiovascular diseases and adverse pregnancy outcomes.⁵

ORTHODONTICS RELATIONSHIP :-

These approaches focus on aligning the teeth and jaw to optimize airway spaces. Techniques such as palate expansion can help widen the airway, reducing the improving overall breathing.⁵

MYOFUNCTIONAL THERAPY:-

This therapy strengthens the muscles of the tongue and oropharynx, promoting proper oral posture and reducing airway obstruction.⁵

LIFESTYLE MODIFICATIONS:-

Encouraging patients to adapt healthier lifestyles including better oral hygiene practices, smoking cessation and a balanced diet, can improve both periodontal and airway health.⁵

LINK BETWEEN AIRWAY AND PERIODONTAL HEALTH:-

The relationship between airway disorders and periodontal health is multifaceted and complex. Airway disorders can exacerbate periodontal diseases through mechanisms such as mouth breathing, leads to dry mouth (xerostomia) and reduces salivary flow, impairing the natural defences against bacterial growth. Conversely, periodontal diseases can affect airway health by promoting systemic inflammation and dissemination of bacteria, potentially worsening respiratory conditions.⁶

CLINICAL EVIDENCE AND STUDIES:-

Numerous studies have explored the connection between airway health and periodontal disease. For example, research has shown that individuals with OSA often have higher rates of periodontitis. the chronic inflammation associated with periodontal diseases can elevate systemic inflammatory markers, contributing to the inflammatory profile seen in OSA patients. Moreover, periodontal health could benefit respiratory functions.⁵

MECHANISM OF INTERACTIONS :-

Several mechanisms underpin the interaction between airway and periodontal health:-

1. Inflammatory pathways
2. Microbial influences
3. Systemic effects

Clinical Approach - The first step in identifying patients with an airway dysfunction is to use an airway questionnaire and an in-office physical examination that includes photographs. During the examination there should be an evaluation of facial form and symmetry, an exam of the nose, the tonsils and adenoids, the tongue, the teeth, and the soft and

hard palates. A home sleep study using a cardiopulmonary coupling device should be completed for a patient suspected to have airway dysfunction based on the questionnaire and examination. A follow-up with a formal sleep study in a lab with a sleep MD may need to be performed to achieve a complete and accurate diagnosis for a patient suspected to have apnea.¹

CLINICAL ASSESSMENT - Proper formation of oral structures consists of a wide U-shaped maxilla and mandible, no malocclusion, space for the tongue to rest properly at the anterior roof of the mouth, and a wide enough nose to create open nasal passages that promote nasal breathing. Poor facial development and asymmetry are two of the most easily identified signs of airway dysfunction. Bottle-feeding, weaning to soft foods, thumb sucking, pacifier use, and mouth breathing are the main causes of poor facial development. The function of the nose is to take in air, which is then warmed, moistened, and filtered. Small amounts of nitric oxide, which play a role in killing dust mites and helps reduce inflammation, is added to the air before going into the lungs. Mouth breathing unfortunately provides none of these benefits. The healthcare provider should evaluate for septal deviations, size of the inferior turbinates and nasal valve stenosis during the evaluation of the nose. Referral to an allergist, ENT, and myofunctional therapist may be needed to achieve proper nasal breathing.¹

Pediatric mouth breathing is reported in 10-15% of children.¹ Characteristic features of mouth breathers is the "Long-faced Syndrome" which describes a long face appearance, dropped eyes, dark spots under eyes, open lips, narrow nostrils, weak cheek muscles, high palate, narrowing of the upper jaw and malocclusion. Mouth breathing patients may report of symptoms such as, dry lips and mouth, snoring and open mouth while sleeping, chronic sinus and ear infections and colds, chronic bad breath, and swollen and red gums that bleed easily. Malocclusions that can be seen associated with airway dysfunction and accompanying poor facial development are open bites, cross bites, impacted teeth, and tooth crowding. Mouth breathers and patients with tongue and lip ties also exhibit signs of altered posture of the tongue, speech deficits, and a swallow abnormality.⁴

Mouth breathing directly affects dental health by causing the drying of oral structures and the decrease of saliva production. Saliva acts to neutralize acid in the mouth and helps to flush away bacteria. Without saliva and its beneficial protective mechanisms, risk of decay and periodontal disease, the pathological

inflammation of the gum and bone support surrounding the teeth, increases. During sleep, mouth breathing decreases intra oral pH as compared to normal breathing. This lowered pH can lead to erosion of tooth surfaces, increased sensitivity of the teeth to temperatures and susceptibility to tooth decay.⁴

Ankyloglossia, also known as a tongue tie, is an embryological remnant of tissue in the midline between the under surface of the tongue and the floor of the mouth that may restrict normal tongue movement. A restricted tongue will exhibit limited proper movement during speech and swallowing. It can make it difficult for infants to properly nurse and thrive. For children, lip and tongue ties can hinder a child's ability to maintain good oral hygiene. Lip and tongue ties create a food trap between the soft tissues of the mouth and the teeth, preventing proper cleaning and movement of food off of tooth surfaces. The extended time food remains on the teeth increases the risk of caries. Gum recession, the loss of gingival height and volume around teeth, can be caused by the constant tension from the ties on the gingiva surrounding teeth. Recession of gingiva exposes the root surfaces of teeth to the intraoral environment. This may cause tooth sensitivity and an increased risk of root erosion and caries.⁴

Bruxism is an oral para-functional activity of teeth grinding and/or jaw clenching. As muscles of the body relax during sleep, the tethered tongue, resting low in the mouth, can fall backward and obstruct the airway, causing difficulty in breathing. The brain responds by sending signals to the jaw to slide forward or protrude, thus opening the airway to allow air into the body. Unfortunately, this protrusive sliding of the lower jaw against the upper jaw causes abrasive grinding of tooth surfaces. Airway related bruxism can lead to loss of tooth structure known as abfractions, cracks in teeth, mobility of teeth, bone loss, pain, and early tooth loss.⁴

Tonsils and Adenoids are another set of critical structures in the airway paradigm. They are lymphatic tissues on each side of the back of the throat and at the junction of where the nasal passages meet the throat. These tissues function to filter out viruses and bacteria and produce antibodies to fight off infection. By age 4, the tonsils and adenoids are fully developed and their size can be graded on a 1-4 scale. Mouth Breathing increases turbulence of breath going directly into the throat and allergies causing postnasal drip of mucous result in chronic inflammation of these two structures. Enlarged tonsils block airways making it difficult to breath,

while also creating or making worse sleep disturbed breathing. If airway restriction exists from these tissues, it is recommended they be removed. Adults only require tonsil removal since the Adenoids recede as we age.¹

Snoring and mouth breathing are two primary indicators of sleep disturbed breathing. **Obstructive sleep apnea** affects approximately 20% of US Adults, of whom about 90% are un-diagnose]. During sleep disturbed breathing, the brain unconsciously recognizes it is not getting enough oxygen and will signal a state of alert, the fight-or-flight response. Our body adrenal glands respond by releasing stress hormone and adrenaline. Over time the adrenaline causes the body's immune system to create chronic inflammation. Sleep is no longer a time for rest, repair, and regeneration, a critical compromise for optimum health. For children, the chronic activation of the sympathetic nervous system, coupled with the lack of oxygen, excess carbon dioxide and fragmented sleep, can lead to ADHD, learning disabilities, anxiety, depression, and aggressive behaviour . During snoring, apnea, and mouth breathing, children's brains and bodies cannot develop correctly. One of the neurological deficits of poor sleep quality, is lower IQ in children. There is approximately a 2.5-fold increase in upper airway resistance during sleep while mouth breathing as compared to nasal breathing in normal subjects. When using the Apnea-Hypopnea Index, obstructive apneas and Hypopneas are more frequent when breathing orally (AHI 43) than nasally (AHI 1.5) Other factors contribute to obstructive sleep apnea, such as obesity, tobacco use, and alcohol consumption, but the basic problem is structural. If we can improve a child's airway development, we can thus prevent the structural compromises that are the core cause of sleep disturbed breathing and its related comorbidities.⁴

FUTURE DIRECTIONS AND RESEARCH:-

- Despite the growing body of evidences, there are still gaps in understanding the full extent of the relationship between airway and periodontal health. Future research should focus on:-
- Longitudinal studies to establish casualities and the long-term benefits of periodontal treatment on airway health.
- Investigating the molecular mechanisms linking periodontal and respiratory inflammation
- Evaluating the effectiveness of integrated treatment approaches in improbbing patient outcomes.⁴

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