Chapter 18

Obstructive Sleep Apnea and Oral Health

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Running Title: Obstructive Sleep Apnea and Oral Health: A Two-Way Street

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Abstract

Obstructive Sleep Apnea (OSA) is a common and serious sleep disorder marked by repeated airway obstruction, leading to fragmented sleep, intermittent hypoxia, and significant systemic health risks. This chapter examines the complex interplay between OSA and oral health, highlighting the role of dental professionals in early detection, management, and interdisciplinary care.

Risk factors for OSA such as obesity, craniofacial anatomy, and lifestyle choices contribute to OSA severity, with consequences ranging from cardiovascular disease and diabetes, to cognitive impairment, and mood disorders.

Oral health implications of OSA include bruxism, dry mouth, periodontal disease, and temporomandibular joint dysfunction, often exacerbated by prolonged Continuous Positive Airway Pressure machine (CPAP) use. Treatment strategies extend beyond CPAP therapy to include oral appliances, myofunctional therapy, and surgical interventions tailored to patient needs. Dentists, as frontline providers, play a crucial role in identifying anatomical risk factors, recommending appropriate therapies, and collaborating with sleep specialists to ensure comprehensive care.

By integrating OSA screening into routine dental practice, early intervention can improve patient outcomes and reduce the long-term burden of untreated sleep apnea. This chapter provides an evidence-based overview of the latest diagnostic tools, treatment modalities, and collaborative approaches essential for managing OSA through an oral health lens.

18.1 Introduction

Obstructive Sleep Apnea (OSA) is a serious sleep disorder characterized by repeated airway obstructions leading to systemic health risks and significant oral health implications. This cessation of breathing during sleep for various durations is a considerable problem, mostly in adults, and to some extent, in children. Continuous Positive Airway Pressure (CPAP) machines are essential devices used to treat obstructive sleep apnea (OSA). The U.S. market for these devices has experienced notable growth over the past decade, driven by increasing awareness and diagnosis of sleep disorders. Forecasts indicate continued growth, with the U.S. market expected to reach around $2.24 billion by 2030, reflecting a compound annual growth rate of 6.2%. In this chapter, we will discuss the epidemiology of sleep apnea in relation to oral health, which are bidirectionally related, meaning certain oral structures can lead to OSA, and OSA and CPAP use, in return, can affect oral health.

18.2 Sleep Apnea

The word apnea comes from the Greek word ápnoia, which is composed of prefix -a, meaning without or lack of, and pnoē, meaning breath or breathing, so, apnea literally means without breath or cessation of breathing (1). Obstructive Sleep Apnea (OSA), a common and chronic medical condition, is one of over 70 sleep disorders characterized by repeated airway obstructions during sleep, involving hypopneas progressing into apnea resulting in hypoxemia, excessive hypoventilation, and respiratory effort-related arousals as a response to upper airway collapse (2). Sleep apnea is characterized by an obstructed airflow for 10 seconds or longer during sleep, accompanied by arterial oxygen desaturation of more than 4% above baseline (3). These episodes of airway occlusion occur during sleep, when muscles surrounding the pharynx relax as a result of decreased neural tone. This muscle relaxation in combination with a negative intrathoracic pressure causes a collapse in the pharynx, blocking the airway. The majority of airway collapses last between 10 and 30 seconds, with some apneas lasting for more than a minute before the brain senses the lack of oxygen in the body and cause a brief arousal from sleep. This pattern can happen hundreds of times in one night and can lead to sudden reductions in blood oxygen levels, with blood oxygen concentration decreasing to 40% in severe cases (3).

During sleep, when the muscles at the back of the throat relax, either by the tongue falling back into the oropharynx when the patient is lying back, or a crowded oropharynx secondary to enlarged tonsils or low draping soft palate blocking the airway, breathing stops and starts during sleep repeatedly. These breathing interruptions caused by repetitive upper airway collapses result from a combination of anatomical, physiological, and lifestyle factors.

The most common type of apnea is OSA, first described over 30 years ago (4), has gained wide interest as number of health-related conditions are implicated with it. If left untreated, **dementia**, **diminished neurocognitive function, decreased immune response to acute infections and chronic diseases, increased risk of motor vehicle accidents, reduced quality of life, hypertension, insulin resistance, and cardiovascular diseases** are among those. (5-7).

There are varying estimates about how common the OSA is. In a systematic review, the overall global population prevalence of OSA was shown to range from 9% to 38% using 24 studies done in North America, Latin America, Europe, Australia and New Zealand, and Asia (8). OSA was higher in men and increased with increasing age, and in some elderly groups, was as high as 90% in men, and 78% in women. The reported occurrence of OSA in the overall adult population has increased over time as well, which has been correlated with increasing rates of obesity (9).

Diagnostic Tools for OSA

The diagnosis OSA relies on objective sleep studies. **Polysomnography** (PSG), the gold standard diagnostic test, is an overnight sleep study that records multiple physiological parameters to assess sleep architecture and breathing abnormalities (2). Key measurements in PSG include the **Apnea-Hypopnea Index (AHI)**, which quantifies the number of apnea (complete airflow cessation for ≥10 seconds) and hypopnea (partial airflow reduction of ≥30% with oxygen desaturation ≥3–4%) events per hour of sleep (10). The **Oxygen Desaturation Index** (ODI) tracks the frequency of oxygen drops ≥3% per hour, correlating with the severity of intermittent hypoxia (11). PSG also records **electroencephalography** (EEG) to monitor brain activity and sleep stages, **electromyography** (EMG) to detect muscle activity and limb movements, and **electrooculography** (EOG) to track eye movements, crucial for identifying **Rapid Eye Movement** (REM) sleep. Additionally, **thoracoabdominal respiratory effort** is assessed using **respiratory inductance plethysmography**, while airflow is measured via **nasal pressure transducers and thermistors**. The combination of these helps differentiate between obstructive and central sleep apnea, determine sleep efficiency, and guide appropriate treatment recommendations. Despite PSG's comprehensive diagnostic capability, **home sleep apnea testing (HSAT)** has emerged as a practical alternative for patients with a high likelihood of moderate to severe OSA. Unlike PSG, HSAT is conducted in a home setting and primarily focuses on measuring airflow, respiratory effort, and oxygen saturation levels to confirm OSA diagnosis (12). While HSAT offers increased accessibility and cost-effectiveness, it may be less reliable in detecting mild OSA or distinguishing between different types of sleep-disordered breathing.

The **Apnea-Hypopnea Index or AHI** is a key measure used to diagnose and assess the severity of OSA**.**

It represents the average number of apnea (complete stoppage of airflow) and hypopnea (partial airway collapse) events per hour of sleep**.** For example, if a person has 100 apnea/hypopnea events over 5 hours of sleep, their AHI would be: 100/5 or 20. Data from Switzerland (13) shows that the median **AHI** was 6.9 events per h in women and 14.9 per h in men. The prevalence of moderate-to-severe sleep-disordered breathing (≥15 events per h) was 23.4% (95% CI 20.9-26.0) in women, and 49.7% (46.6-52.8) in men.

Central Sleep Apnea (CSA) on the other hand, is related to impaired brain signaling, leading to irregular breathing patterns. This occurs due to brainstem dysfunction (14). When the brain fails to send the correct signals to the respiratory muscles, it can lead to CSA (15). In addition, heart failure and stroke, and the other conditions affecting brain and heart function can increase the CSA risk. Certain medications such as **opioids** can also suppress the brain's breathing control potentially causing CSA as a direct relation is shown between the AHI and the daily dosage of **methadone** (16).

Among the symptoms of OSA are loud and **persistent snoring**, excessive **daytime sleepiness**, **headaches** in the morning, **dry mouth** or sore throat upon waking, **bruxism** or teeth grinding, and **difficulty in concentrating,** and or **mood changes**. Some of the oral health effects are discussed in detail below.

18.3 Causes of Sleep Apnea

OSA is caused by partial or complete blockage of the airway during sleep, leading to repeated breathing pauses as previously mentioned (17). The known causes of OSA are a combination of **anatomical, physiological, lifestyle, genetic, and medical conditions**. The main causes include the excessive relaxation of throat muscles during sleep causing airway to collapse, and narrow airways due to **enlarged tonsils, adenoids, enlarged tongue, enlarged uvula, low draping soft palate. Obesity** contributes to fat deposits below the tongue, around the neck and throat, narrowing the airway (18, 19). Some people naturally have a smaller airway, increasing their risk of collapse. Weak muscles in the throat, often due to aging or neurological conditions, can also contribute to airway obstruction.

18.3.1 Unmodifiable and Modifiable Risk Factors for Sleep Apnea

Risk factors for OSA can be put in to several categories as below.

- **Anatomical (e.g., Enlarged tonsils, adenoids, a low-hanging soft palate, or a retruded jaw** can contribute to airway obstruction.**)**
- **Physiological (e.g., muscle tone, aging effects)** Aging reduces upper airway muscle tone, increasing the likelihood of collapse.

- **Lifestyle (e.g., obesity, alcohol use, smoking).** Obesity increases fat deposits around the airway, alcohol relaxes throat muscles, and smoking promotes inflammation, all of which raise OSA risk

Age increases the OSA risk due to reduced upper airway muscle tone and changes in fat distribution (20). **Men** are 2–3 times more likely to have OSA, though the risk in **women** also increases after menopause. The occurrence of OSA shows a significant positive correlation with both **age and obesity** as well, as it occurs in 90% in elderly men, and 78% in elderly women (7). OSA becomes more common with older **age** and differ between men and women.

Lifestyle and Medical Conditions such as **alcohol and sedative use** relax throat muscles, increasing airway collapse (16) and can suppress the central arousal response leading to OSA (21). **Smoking** causes inflammation in the respiratory tract and fluid retention in the airway, decreasing inspiratory effort and volume (22).

Sex and hormonal differences can also lead to OSA as males are at higher risk than premenopausal females, possibly due to differences in fat distribution and hormonal protection in females. **Family history and genetic predisposition** to craniofacial abnormalities such as narrow mandible and maxilla, and obesity are also important factors (23). Genetic predisposition and family history increase the risk due to inherited traits like airway structure and fat distribution (15). Nasal conditions such as **deviated nasal septum, enlarged nasal turbinate and chronic nasal congestion and obstruction** can increase airway resistance and predisposition to OSA (24).

Among the physical and biological risk factors that are **modifiable are obesity, large neck circumference, enlarged tonsils or adenoids, nasal congestion, and small/narrow jaws or recessed chin or retrognathia** (25). The most significant risk factor for OSA is **obesity** which increases fat accumulation around the pharyngeal structures, leading to airway collapse (5, 26). Large neck circumference greater than 17 inches (43 cm) in men and 16 inches (40 cm) in women also increases the risk (27). **Enlarged tonsils or adenoids** are common in children with OSA (25). **Nasal congestion or chronic nasal obstruction** from allergies or structural issues such as deviated septum can worsen OSA, **Small/narrow jaws or recessed chin** or **retrognathia** affect airway size and stability, especially in children where the effects can present as ADHD, excessive sleepiness in class, and restlessness.

18.3.2 Dental/ Oral Causes

High lingual frenum contribute to **impaired growth of the mandible**, poor tongue function of swallowing and speech, dental crowding, all contributing to risk of apneic events. **Malocclusion and jaw structure** are related to sleep apnea as the jaw size and position and airway size are key factors in sleep apnea. People with narrow jaws or set back mandibles are at higher risk. Palate is at the nasal base and a **narrow palate** typically seen in children with unilateral or bilateral dental cross bite, have a high incidence of snoring and sleep apnea in children. **Narrow mandible** typically leads to dental crowding and **narrow oral cavity** where the tongue will rest above the occlusal plane and exhibit ridges (imprints of the lingual surfaces of the posterior mandibular teeth) on the lateral borders of the tongue increasing the likelihood of tongue falling back into the oropharynx when supine and compounded with lack of neural tone during sleep, increases the risk for an apneic event.

While oral structures can influence OSA as described above, there are considerable oral health implications related to OSA as well. These include **dry mouth or xerostomia** that is caused by mouth breathing which is a protective response for the physiologic need for maintaining aerobic cellular metabolism by sustainable blood oxygen saturation in absence of nasal inspiration. Mouth breathing due to blocked airways increases the **risk of cavities, gum disease, and bad breath**.

Bruxism or teeth grinding is also often lead to development of **mandibular lingual tori and worn-down teeth** which are prone to tooth fracture, jaw and orofacial pain, and **temporomandibular joint (TMJ) disorders**. **Acid Reflux** (GERD) is a common condition resulting from hypoventilation efforts putting pressure on the stomach causing gastric acids being spilled into the esophagus and oral cavity right after an arousal event and is linked to **Barrett's esophagus**, **erosion, and weakening of enamel**. As people with sleep apnea are more prone to gum inflammation and periodontal disease due to impaired immune response to chronic inflammation and **dry mouth**, they may experience **gum disease**. Finally, oral appliance-related effects can also be seen in the mouth. Wearing oral appliances for sleep apnea can have a protective function and decrease bruxism and TMJ related symptoms, but if oral appliance therapy is not calibrated/titrated or not monitored properly, it can cause **bite changes, tooth movement**, or TMJ issues which are discussed later.

18.3.3 Sleep Apnea and Other Diseases

OSA is strongly linked to various systemic health conditions. Understanding these connections is crucial for the holistic and overall management of OSA. Sleep apnea increases the risk of serious **cardiovascular conditions**. **Diabetes and hypertension** are strongly associated with OSA as shown in a study from Switzerland (13) in which, after multivariable adjustment, the upper quartile for the AHI (>20·6 events

per h) was associated independently with the presence of hypertension (odds ratio 1·60, 95% CI 1·14-2·26; p=0·0292 for trend across severity quartiles), diabetes (2·00, 1·05-3·99; p=0·0467), **metabolic syndrome** (2·80, 1·86-4·29; p<0·0001), and **depression** (1·92, 1·01-3·64; p=0·0292). **Heart disease and stroke** both can contribute to and result from OSA.

The repeated drops in oxygen during sleep lead to **oxidative stress, inflammation, and sympathetic nervous system activation**, all of which can damage the cardiovascular system. 50% of sleep apnea patients have high blood pressure. **Atrial Fibrillation** (AFib) is strongly associated with untreated sleep apnea (28). Obstructive sleep apnea doubles the risk of stroke and coronary artery disease and is the leading cause of stroke, heart attack and death during sleep (29). **Type 2 Diabetes and Metabolic Syndrome** are related to sleep apnea (30) as it is an independent risk factor for insulin resistance and glucose intolerance. Poor sleep quality disrupts production and release of certain hormones and metabolic processes, increasing the likelihood of obesity (nearly 70% of sleep apnea patients are overweight or obese), **dyslipidemia or elevated cholesterol and triglyceride levels, and Fatty Liver Disease** which is common in sleep apnea due to chronic low oxygen levels. **Cognitive Decline and Brain Health** are related to chronic oxygen deprivation, beta-amyloid plaque formation and fragmented sleep negatively affect brain health and function. **Memory loss** is linked to hippocampal atrophy, the brain area responsible for memory. Increased risk of **Alzheimer's Disease** can be seen in sleep apnea patients (31) as it may accelerate the buildup of beta-amyloid plaques. There is also a strong connection with mood disorders such as **depression, anxiety, and irritability**.

Apnea can also lead to **oral and systemic inflammation** as apnea results in decreased immune function which promotes a chronic inflammatory state that can worsen periodontal disease and vice versa. **Cancer risk** may also be higher among apnea patients as the chronic intermittent hypoxia caused by sleep apnea may promote tumor growth and metastasis, particularly in lung, breast, and colon cancers. **Immune System Dysregulation** is also affected by apnea as poor sleep quality and can compromise immune function, making sleep apnea patients more susceptible to infections and chronic inflammatory conditions. Sleep apnea during pregnancy can increase the risk of gestational diabetes, pre-eclampsia, and preterm birth and low birth weight, conditions that are also associated with poor oral health, (32-35).

18.3.4 Sleep Apnea and Oral Health

Intraoral Mandibular Advancement Devices (MAD) a SomnoDent® (France)

Dentists are often the first to identify sleep apnea symptoms and they can collaborate with sleep physicians for diagnosis and treatment. Dentists can also screen for apnea and identify the individual risk factors such as enlarged tongue or tonsils, narrow or high-arched palate, dental crowding & lingually tipped mandibular posterior teeth, low draping soft palate, enlarged or elongated uvula, worn teeth from bruxism, mandibular lingual tori, TMJ disorders and jaw positioning issues. They can then recommend a home sleep study or an in-lab polysomnography to confirm severity of sleep apnea and when medically appropriate and based on practice parameters and guidelines set by the American Academy of Sleep Medicine and Dental Sleep Medicine (2), use oral appliance therapy such as Mandibular Advancement Devices (MADs – Figure above). These custom-made devices use the fundamental premise why cardio-pulmonary resuscitation (CPR) is very effective in establishing and maintaining patent upper airway by reposition the jaw, and by default the tongue, forward to prevent airway collapse. This is effective and comparable to CPAP therapy for mild to moderate sleep apnea, and is a good alternative for those who can't tolerate CPAP machines, and also before surgical intervention is considered. There is limited evidence to suggest that long-term use of MAD might improve comorbidities and healthcare (36). Adjunctive treatments such as **dentofacial orthopedics and orthodontics** can be used to expand the mandible and palate and improve nasal breathing and airway space, and myofunctional therapy such as tongue and facial muscle exercises can strengthen the airway muscles. Surgical options such as orthognathic surgery or soft palate reduction may be needed in severe cases as described below.

18.4 Interventions

Mild, moderate, and severe OSA based on OHI scores are shown in Table 1 with treatment options.

Table 1. The severity of sleep apnea based on AHI values:

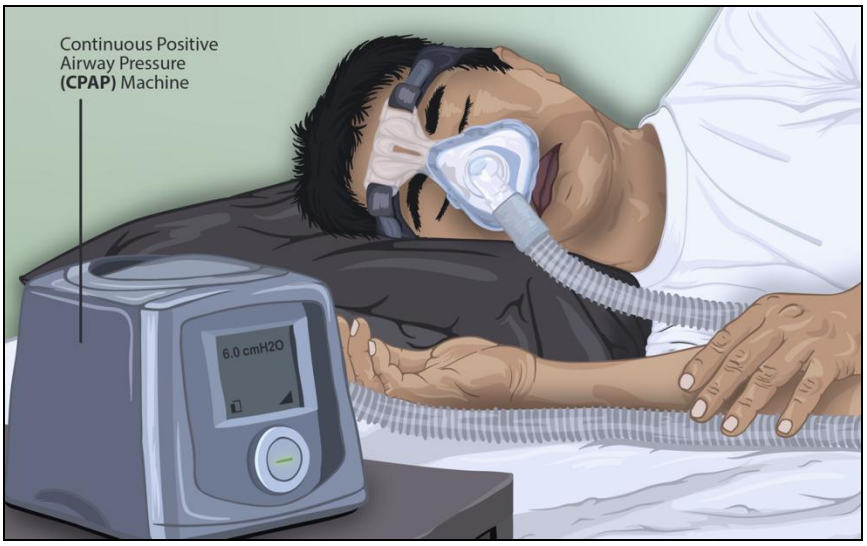
AHI Score	Sleep Apnea Severity	Symptoms
0-4.9	Normal	No significant airway obstruction
5-14.9	Mild OSA	Snoring, occasional daytime sleepiness
15-29.9	Moderate OSA	Loud snoring, frequent awakenings, daytime fatigue
≥30	Severe OSA	Oxygen desaturation, high risk of heart disease, excessive daytime sleepiness

- Mild OSA (AHI 5-14.9) → May not always need CPAP; lifestyle changes can help.
- Moderate-to-severe OSA (AHI ≥15) → Usually requires CPAP or another treatment.

18.4.1 Continuous Positive Air Pressure or CPAP Machines and OSA

CPAP machines are highly effective for severe sleep apnea when used as recommended but **can cause oral health issues such as dry mouth, lip and gum irritation or swelling, risk of cavities due to changes in salivary flow, and lip and mouth sores from the CPAP mask**. Dentists often help manage these side effects by prescribing **saliva substitutes, fluoride treatments**, and other **oral health interventions**. When it comes to treating sleep apnea, oral appliances and surgery are key alternatives or adjuncts to CPAP, especially for those who cannot tolerate CPAP. Oral Appliances are considered the best nonsurgical and reversible treatment option for mild to moderate sleep apnea, especially for patients who cannot tolerate CPAP. Surgery is ideal for severe sleep apnea or when anatomical abnormalities are the primary cause. In some cases, combining multiple treatments—such as oral appliances, CPAP, surgery, and lifestyle changes—yields the best outcomes.

CPAP users should check their mask-fit regularly as a poorly fitted mask can cause air leaks, increasing mouth breathing, and dryness. This can be prevented by working with the sleep therapist or provider to adjust the fit and reduce side effects. Mask choices are numerous as well. Those who primarily breathe through the mouth, a full-face mask (covering both nose and mouth) may help prevent dry mouth. In any event, seeing the dentist regularly (every 6 months or more often if needed) to discuss the CPAP use can help them monitor for signs of dry mouth, cavities, or gum disease. Those who experience mouth sores, gum irritation, or signs of infection, their sleep doctor and the dentist can intervene easily.



18.4.2 Oral Appliances

Oral appliances for sleep apnea are patient-specific, custom-made, and worn during sleep to help keep the airway open by repositioning the jaw, tongue, or soft tissues. These include Mandibular Advancement Devices (MADs), the most common type for sleep apnea. These appliances move the mandible slightly forward to prevent airway collapse and resembles a sports mouthguard or orthodontic retainer. Among the pros of these devices are that they are comfortable and easy to use compared to CPAP, effective for mild to moderate obstructive sleep apnea, and are non-motorized, portable, and silent. But they are not without some **cons such as jaw pain, tooth movement, or bite changes over time** and these devices are not as effective for severe sleep apnea. These side effects are easily mitigated by properly fitted and titrated oral appliance, use of a morning repositioner/aligner and periodic follow-ups. Tongue Retaining Devices (TRDs) holds the tongue forward to prevent it from blocking the airway and often recommended for patients who are edentulous or with fewer than 3 teeth per quadrant, with large tongues or those who cannot tolerate MADs. Among the pros of TRDs is that it is a simple design, and no jaw repositioning is required. Among the **cons are that they are less comfortable than MADs for some users and might cause drooling or tongue soreness**. The oral appliances are made after a thorough initial evaluation where the dentist examines the airway, jaw structure, and teeth and take custom impressions using either digital scans or physical molds of teeth and a construction bite that defines the protrusive and vertical position of the jaws for the lab to fabricate the oral appliance. Then, as in dentures, appliance is fitted and adjusted for maximum comfort and effectiveness followed by regular check-ups to monitor for bite changes, appliance wear, or TMJ issues.

The Combination Therapy are better for some patients when oral appliances are used along with CPAP at lower pressures or other adjunctive therapies like myofunctional therapy.

18.4.3 Surgical Options

Surgery is considered when oral appliances and CPAP fail or when anatomical abnormalities significantly contribute to airway obstruction. Among the common surgical options are **Uvulo-palato-pharyngoplasty (UPPP)** in which excess tissue is removed from the soft palate and uvula to widen the airway. This method is effective for reducing snoring and mild sleep apnea but may cause swallowing difficulties or changes in voice. **Genioglossus Advancement (GA)** is repositioning of the tongue by pulling the tongue muscle attachment forward, preventing airway collapse and is often combined with other procedures for better results. **Maxillomandibular Advancement (MMA)** is the most effective surgical treatment for moderate to severe sleep apnea in which the upper and lower jaws are moved forward to increase airway space and it has shown a high success rate (up to 90%), but recovery can take longer. **Hypoglossal Nerve Stimulation (Inspire Therapy)** is an implantable device that stimulates the hypoglossal nerve, keeping the tongue from blocking the airway and is activated during sleep with a remote control. This technique is minimally invasive with a growing success rate. S**eptoplasty and Turbinate Reduction** can correct a deviated nasal septum or reduce enlarged turbinates to improve nasal breathing and is often combined with other treatments for sleep apnea. Finally, **Tonsillectomy and Adenoidectomy** are common in children with sleep apnea caused by enlarged tonsils or adenoids and these significantly improves airway and breathing.

18.4.4 The Dentist's Role in Systemic Health

Given the significant overlap between oral conditions and health, and systemic conditions and overall health, dentists play an important and integral part in identifying patients at risk and referring them to specialists for diagnosis, and when medically appropriate, in the overall management of the sleep apnea patient.

Dentists' role is important as CPAP therapy can also lead to several oral health issues like dry mouth, gum irritation, and an increased risk of cavities. Dry mouth or xerostomia is usually due to reduced salivary flow that can lead to cavities, gum disease, and bad breath. Dry mouth makes it easier for bacteria to grow, leading to tooth decay. Gum Inflammation or Irritation is usually caused by the air pressure or friction from the CPAP mask. Mouth sores or ulcers occur due to poorly fitting masks or straps. CPAP therapy can also result in retrusion of the maxillary anterior teeth and impaired maxillary

growth and development, especially in the pediatric patient. Among the ways of reducing these risks are regular dental checkups to identify the oral symptoms related to sleep apnea early, maintaining good oral hygiene by **brushing teeth twice** a day and **flossing** daily, using **fluoride toothpaste** and **mouthwash** to prevent cavities, and staying **hydrated** to combat dry mouth. Use of custom night guards can help with bruxism and protect teeth from damage. It is often advisable to collaborate among specialists such as sleep doctors, ENT specialists, and dentists and orthodontists for comprehensive care.

18.4.5 Oral Health Care in Sleep Apnea Patients

Oral health care tips for the CPAP users include **staying hydrated** by drinking plenty of water throughout the day and by **avoiding alcohol and caffeine**, which can worsen dry mouth. A **use of a humidifier** may be necessary unless the CPAP machine has a built-in humidifier. Increase humidity can reduce dry mouth and nasal irritation. A heated humidifier may provide even more moisture. Maintaining **excellent oral hygiene** even with the above measures are important. Patients should brush twice a day with fluoride toothpaste, floss daily to remove plaque between teeth or use micro interdental brushes, and use a fluoride mouthwash or prescription fluoride gel to strengthen teeth and prevent cavities, and use an alcohol-free mouthwash to avoid further drying. To overcome xerostomia, one can try **saliva substitutes** that are over-the-counter. There is evidence that **xylitol-based products** may also promote saliva flow and prevent cavities.

In **conclusion**, OSA is a growing problem in the aging population that can lead to many unwanted comorbidities. There are several modifiable risk factors that can be corrected. Treatment options are many and there are teams of specialists who can help the OSA patients lead comfortable lives. There are clear guidelines to follow with OSA and the chosen treatment modalities as well.

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