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From the Desk of Dr. Paul Chaiken, Guest Editor



I first became interested in the field of sleep apnea, or sleep disordered breathing, because I have seen the effects of bruxism in my practice and wanted to help my patients in a more significant way than just making occlusal splints to manage their bruxism. My research into sleep bruxism lead me into the field of sleep disordered breathing.

To get involved this treatment, continuing education is a must. There are many opportunities to obtain this education, but be cautious of programs that are connected to high priced diagnostic or therapeutic items to purchase. The best programs are non-biased and not commercial. The American Academy of Dental Sleep Medicine offers some good introductory courses, as well as an annual meeting. Dr. James Metz from Columbus, Ohio and Dr. Jeffrey Rouse from San Antonio Texas are also excellent references for continuing your education in this area.

Getting involved with local sleep medicine physicians is an important part of developing your practice and treatment protocols. Specifically, neurologists, pulmonologists, and sleep medicine specialists will be needed to collaborate treatment and for definitive diagnostic services.

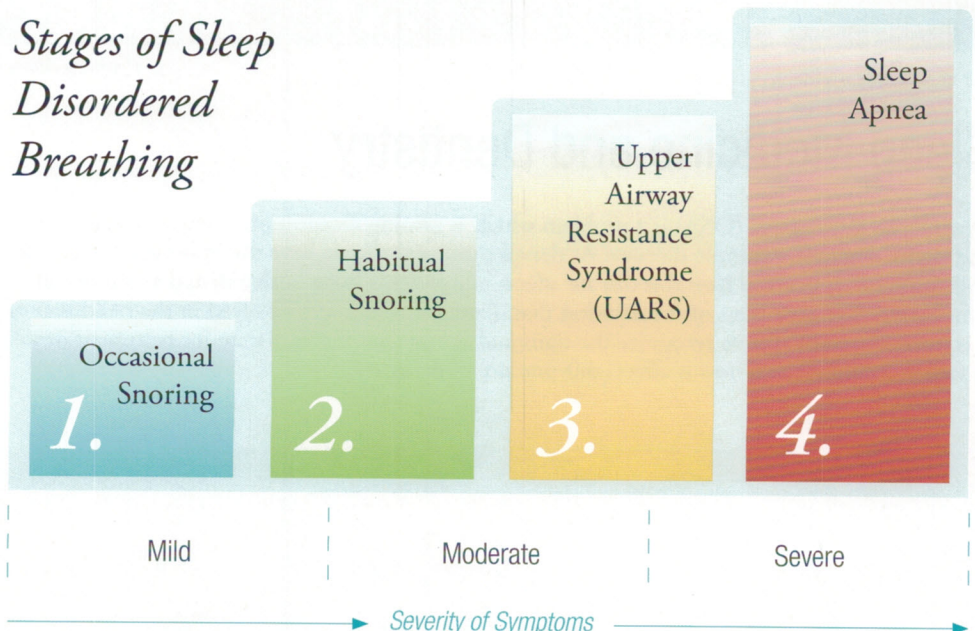
In my personal practice, I have found a great assessment team to first diagnose the patient and collaboratively treat through a multitude of options. I am continually surprised at how medicine and dentistry have not intertwined more closely. This is a critical step in treating cases successfully.

I lecture nationwide on this topic and am pleased to share my experience with others. If you have further questions or need clarification on any aspect of treating sleep disorders in your practice, feel free to contact me at drchaiken@aol.com. As always, thanks for reading THE DENTAL ADVISOR!

Sleep Medicine and Dentistry

Sleep apnea is a dangerous sleep disorder that happens when a patient's breathing is interrupted during sleep. It is common in both medical and dental practices, and it presents a serious threat to a patient's health. Sleep apnea is actually part of a series of events which is best described as "sleep disordered breathing."

Stages of Sleep Disordered Breathing



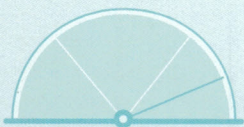
Sleep Disordered Breathing

On a continuum, sleep disordered breathing starts out as occasional snoring. Snoring occurs as a sound caused by air turbulence inducing vibration of the pharyngeal tissues during sleep. Several factors are responsible for this collapse of the pharyngeal airway, including the use of sedatives or drinking alcohol, as well as obesity. Snoring is a problem for the patient as it significantly increases the risk of carotid artery atherosclerosis. Vibrations from snoring get transmitted to the carotid artery, and the amount of plaque accumulation increases as snoring intensity increases. Snoring is also a social problem and has an impact on the bed partner of the snorer, and this affects relationships. According to a study at the Mayo Clinic, bed partners woke up at least partially on average of 21 times per hour while the snorers were awakened 27 times per hour. This “second hand snoring” causes marital problems and sexual dysfunction. Snoring is reported in 40% of men and 24% of women, and it is likely to increase due to the current epidemic of obesity in the United States.

Along the continuum of sleep disordered breathing, the occasional snorer becomes a habitual snorer, and this can lead to the next recognized category known as upper airway resistance syndrome or UARS. UARS is an increased respiratory effort required due to the narrowing of the pharynx during sleep, like snoring, but oxygen levels do not desaturate below 4% like in sleep apnea. As an intermediate form of sleep disordered breathing between snoring and sleep apnea, patients experience headache, gastro esophageal reflux disease (GERD), depression, anxiety, bruxism, and temporomandibular dysfunction (TMD). These patients are mostly younger and more often females. They are commonly misdiagnosed as having chronic fatigue syndrome and fibromyalgia.

The last entry on the continuum of sleep disordered breathing is sleep apnea. The two main types of sleep apnea include central sleep apnea and obstructive sleep apnea. Central sleep apnea occurs due to medical or neurological complications when the brain does not send signals to the muscles responsible for controlling breathing. The more common form is obstructive sleep apnea (OSA) which occurs when the tongue and throat muscles relax during sleep causing a blockage of the airway. These apnea events, where breathing is stopped for 10 seconds or longer, can occur as often as 100 times per hour. A blocked airway means reduced oxygen going to vital tissues and organs.

Apnea-Hypopnea Index (AHI)



Apnea: a decrease in airflow of greater than 50% for more than 10 seconds, 5 or more times per hour of sleep with a decrease of oxygen saturation exceeding 4%.

Hypopnea: a decrease of air flow by 30% with oxygen desaturation of more than 3%.

Mild	Moderate	Severe
5-15 times per hour	16-30 times per hour	More than 30 times per hour

Once the patient falls asleep and the muscles relax, the airway collapses, airflow is blocked to the lungs with the reduction of oxygen to supply the body and brain. The obstruction persists until the brain partially awakes the patient to re-open the airway, called a micro arousal. The micro arousal can be unconscious so the patient is unaware of its occurrence, but this cycle repeats itself several times per hour in sleep apnea and the patient cannot get a restful night of sleep. These patients have excessive daytime sleepiness, which affects neurocognitive functioning during the day and is responsible for increased risk for injury, decreased work or school performance, and is known to be responsible for motor vehicle accidents. In fact, it has been reported that over 40% of commercial vehicle accidents are due to driver sleepiness. Additionally, there is a list of medical conditions listed as comorbidities, or consequences of OSA. These include systemic hypertension, obesity, atrial fibrillation, congestive heart failure, diabetes, coronary artery disease, stroke, and sudden nocturnal death.

Risk factors for developing sleep apnea include:

- Male over 40 years of age
- Overweight
- Large neck size over 17 inches for males; 16 inches for females
- Hypertension
- Retrognathia
(commonly called overbite)
- Micrognathia
(abnormally small jaw)
- Enlarged tongue or tonsils

As we have a better understanding of the etiology and pathophysiology of OSA, it becomes clear that although dental professionals must be able to recognize the signs and symptoms of OSA, it is primarily a medical condition which requires a diagnosis by a sleep medicine physician. A diagnosis is made by physical examination of presence of risk factors, as well as evaluation of the oral-pharyngeal space called the Mallampati classification. In addition to the physical exam, a careful history is needed. This often includes a survey called the Epworth Sleepiness Scale. The gold standard for diagnosis, however, is the overnight sleep study called polysomnography which measures several physiologic activities during sleep. A sleep medicine physician uses this test to measure air flow, blood oxygen level, breathing patterns, muscle activity, pulse rate, blood oxygen levels, and brain activity (EEG).

Once the sleep study (PSG) is completed and the apnea hypopnea index (AHI) is scored, treatment options should be considered. Many sleep medicine physicians prefer to recommend the continuous positive airway pressure device (CPAP) to treat OSA. Considered the “gold standard” for treatment, especially for severe OSA, the CPAP opens the airway through air pressure delivered as the patient wears a mask that fits over the nose and mouth and is connected to an air compressor. There are various types of CPAP machines and masks, and they are well researched and highly effective in treating OSA. The main problem with CPAP therapy is patient compliance. The mask and tubing can be uncomfortable; it can cause dryness and nasal congestion, and may not be tolerated by some patients due to claustrophobia. Various studies have measured CPAP compliance by patients as less than 50% for nightly use, and that 60 to 70% of patients do not wear it after one year. In recognition of the problems with CPAP usage, more physicians, patients, and dentists have become familiar with oral appliance therapy. Dental appliances are a valid option for patients who cannot tolerate a CPAP.

Treatment options for OSA include:

1. **Behavioral interventions:** avoidance of alcohol and sedatives or narcotics, smoking cessation, weight reduction, and avoiding supine sleep positions.
2. **Medical interventions:** CPAP, or continuous positive airway pressure.
3. **Surgical interventions:** tonsillectomy and adenoidectomy, uvulopalatopharyngoplasty (UPPP), and maxillo-mandibular advancement.
4. **Dental interventions:** oral appliance therapy.

Evaluation and Treatment in the Dental Practice

In order for a dentist to get involved in the treatment of sleep disordered breathing patients, the first requirement should be obtaining sufficient education about this disease through available training. The American Academy of Dental Sleep Medicine (AADSM.org) is an excellent resource for non-biased education. Many industry sponsored training opportunities also exist.

Dental evaluation of the patient who presents with sleep disordered breathing starts with a history and physical exam. This includes a dental exam, occlusal classification, periodontal and TMJ evaluation. The oropharyngeal tissues are noted by size of the tongue, soft palate, uvula, and tonsils. Cephalometric radiographs are taken to measure posterior airway space. Cone beam CT and MRI scans can also be used for this examination. The dental evaluation for treatment of OSA must be supplemented by a diagnosis by a sleep medicine physician.

How Dental Sleep Appliances Work

Oral appliance therapy mostly involves mandibular advancement to open the airway. There are many variations of design of these mandibular repositioning devices (MRDs). They attach to both the upper and lower jaw and are adjustable to the amount of advancement needed for therapeutic effect. Some of the more popular types of appliances used are the *Thornton Adjustable Positioner (TAP)* (Airway Management), *Somnomed* (Somnomed), *Herbst* (Dentaurum), and *EMA* (Myerson). Accurate impressions are needed as well as a bite registration of the correct jaw position. The *George Gauge* (Great Lakes Orthodontics) is an instrument used to determine and record the optimal amount of mandibular protrusion. Individual patient anatomy, sleep position, and preferences help determine the appropriate appliance.

Informed consent is recommended prior to the appliance therapy due to the potential for adverse effects in some patients. These may include occlusal changes, tooth position changes, and TMJ discomfort. These complications are generally minor and temporary in nature.

Following a period of time wearing the repositioning appliance, the patient returns to the dental office for evaluation of their symptoms. A follow up Epworth Sleepiness Scale is helpful to compare before and after results. Objective data can also be measured using a pulse oximeter or a home sleep test. Examples of home sleep tests which may be used by dentists for this purpose are the Apnea Link, ARES, and the Itamar Watch-PAT. This information can then be used to adjust or titrate the amount of mandibular protrusion to increase the airway space. In many cases a follow up polysomnogram (PSG) is done to provide definitive diagnostics.

Factors to Consider When Treating Sleep Disorders in Your Practice

Obstructive sleep apnea is a medical disease which must be diagnosed by a physician. The dentist, however, plays a critical role in the identification of these patients. In addition to the oral findings commonly found in these patients, one of the most common findings in dental practices is tooth wear. The etiology of tooth wear is multi-factorial; however, it is commonly caused by grinding and clenching of the teeth. When this activity occurs during sleep, we call this sleep bruxism. It is commonly thought that bruxism is related to occlusion, but this has not been proven. What is known is that airway obstruction stimulates a patient to clench or grind unconsciously to open the airway. These sleep bruxism episodes, while causing tooth wear and fracture of dental restorations, are also responsible for an increase in respiratory ventilation. In short, bruxism protects the airway, and this is a pattern seen in both adults and children with sleep disordered breathing. The use of occlusal splints, or night guards, is often recommended for patients who present with tooth wear. In the case of a centric relation splint, this may position the mandible in a way that aggravates the respiratory disturbance. Therefore, patients should be evaluated for OSA prior to using an occlusal splint.

Another cause of tooth wear seen in the dental practice is erosive in nature, caused by gastro esophageal reflux disorder (GERD). Studies have shown that an increase in intrathoracic pressure found in patients with SDB allow the acid content of the stomach to reach the oral cavity. The palatal surface of maxillary molars is the most common area for damage, but this is also dependent on the position that the patient sleeps in during these episodes. Dr. Jeffrey Rouse is a prosthodontist who has written about the connection between sleep bruxism, sleep disturbance, and sleep related GERD, which he calls the "Bruxism Triad."

Regardless of how you plan to treat sleep disorders in your practice, it is critical to first educate yourself on available methods, meet with physicians who are treating sleep disorders, and set a diagnostic and treatment protocol specific to your patient. The integration of medical conditions with dental health and treatment is no longer a new concept. Patients will respond positively to a multidisciplinary approach and collaboration between physicians and dentists.

About the Author: Paul J. Chaiken, DDS



Paul J. Chaiken, DDS is currently in private practice of restorative dentistry and dental sleep medicine in Chicago, Illinois. He is an assistant clinical professor at Northwestern University, Feinberg School of Medicine and on the medical staff of Northwestern Memorial Hospital in Chicago. Dr. Chaiken attended Indiana University in Bloomington and received his dental degree from Loyola University in Chicago. He has served as the program chairman of the Chicago Academy of Interdisciplinary Dentofacial Therapy, on the peer review board for the Chicago Dental Society, and as a faculty member for Spear Education at the Scottsdale Center for Dentistry.

Dr. Chaiken has received fellowships from the American College of Dentists and the Academy of General Dentistry, and is currently a clinical consultant for THE DENTAL ADVISOR. He is a member of the American Dental Association, Chicago Dental Society, Chicago Academy of Interdisciplinary Dentofacial Therapy, and the American Academy of Dental Sleep Medicine.