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Breathless: Oral Signs of a Silent Epidemic

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Abstract

This is an exciting time to be in dentistry. Dentistry and dental hygiene are growing as medical specialties. As our understanding of the multiple links between the mouth and the body has increased, our roles have expanded to include comprehensive care of the patient's whole health. One aspect of whole health care that can have an enormous life-changing and life-saving effect is to screen for sleep-disordered breathing. Breathing is the most essential function of our bodies. Without oxygen, we cannot survive. Yet, until recently, breathing was not considered a part of dentistry's scope of practice. With the advent of comprehensive health care and integrative dental medicine, focus on the central role of airway and breathing disorders represents a shift in dentistry's approach to patient care.¹

Educational objectives

- Identify various types of sleep-disordered breathing
- Describe the screening process for identifying sleep-disordered breathing
- Appraise the risks of undiagnosed and untreated sleep-disordered breathing
- Recognize the signs and symptoms for sleep-disordered breathing in adults
- Distinguish the treatment options available for sleep-disordered breathing

In 2017, the American Dental Association (ADA) adopted a policy addressing dentistry's role in discovering and treating sleep-breathing disorders, including obstructive sleep apnea (OSA). In OSA, a physical obstruction, such as the tongue or the pharyngeal muscles, blocks the airway, which interferes with breathing while the person is asleep. People with OSA have multiple episodes of difficulty breathing, with too little oxygen (hypopnea) or a complete lack of breathing (apnea) at night, which can severely impact health. The ADA policy encourages dental professionals to screen patients for sleep-disordered breathing and to collaborate with medical physicians to manage patients with OSA.² The focus on the airway, which was never part of the traditional dental school curriculum, is now a part of mainstream dentistry.

Dental professionals have easy access to examine their patients' airways at every appointment, and so are in the perfect position to be the first to discover possible airway restrictions and sleep-disordered breathing.³ The diagnosis of sleep-disordered breathing must be made by a sleep specialist; however, many people will not seek a sleep evaluation without the recommendation of another health-care professional. And this is where the dental professional can make an impact.

The ADA states that approximately 60% of Americans see a dentist annually.⁴ It is estimated that 23 million Americans suffer from OSA, with 80% of moderate to severe cases undiagnosed.⁵ This means it is most likely that several people who enter our practices every day suffer from undiagnosed airway restrictions and sleep-disordered breathing.

Who is at risk for obstructive sleep apnea?

This condition can strike people of any age, including infants and children, but it is most frequently seen in men over 40, especially those who are overweight or obese. The increasing obesity rate in the United States is believed to be related to the increase in OSA.⁶ Too little good-quality, restful sleep can contribute to obesity, and it may be unclear which came first, the obesity or the OSA.

In no way, however, is OSA limited to overweight men. Many women, even slim women, have been diagnosed with OSA or other types of sleep-disordered breathing, so clinicians must be vigilant to screen every patient, regardless of age, sex, or body type, for airway disorders.⁷

Obstructive sleep apnea and snoring

OSA is the most common form of sleep-disordered breathing. In OSA, a person stops breathing during sleep and, as a result, the brain experiences repeated episodes of suffocating.³ In an attempt to get critical oxygen, the brain signals the person to gasp for air, which is often heard as a loud snort or snore. Snoring is viewed as embarrassing and people are often hesitant to admit that they snore. Therefore, many people go untreated and are at risk of serious health consequences. Additionally, many people believe that simple snoring is not a significant concern, but all snoring is abnormal and should be considered a serious symptom and possible sign of OSA.⁸

The central characteristic of OSA is the increased collapsibility of the upper airway during sleep. The restriction or blockage of the airway occurs during sleep, usually when the tongue collapses against the soft palate and the soft palate collapses against the back of the throat. The result is markedly reduced or absent airflow from the nose or mouth. This is usually accompanied by desaturation of oxyhemoglobin (oxygenated blood) and is typically terminated by a brief micro-arousal in which the brain rouses the sleeper, usually only partially, to signal breathing to resume.³ The dental professional must refer to an otolaryngologist to evaluate nasal patency.

In those with severe OSA, this can happen hundreds of times a night, leading to sustained reduction in oxyhemoglobin saturation. This stresses the sleeper's body and causes sleep fragmentation, often most intensely late in the sleep cycle during slow-wave and rapid-eye-movement (REM) sleep. As a result, the patient's sleep is extremely fragmented and of poor quality.³

Symptoms may include snoring, pauses in breathing, and disturbed sleep. This sleep disturbance stimulates the parasympathetic/sympathetic dysregulation that is very stressful to the body and increases systemic inflammation.⁹ Systemic inflammation is the number one factor in atherosclerosis and accelerated aging.¹⁰ This is one of the ways that OSA contributes to illness and death.

Common misdiagnosis

Often, people with sleep-disordered breathing are misdiagnosed with other conditions that present with similar symptoms. According to DeWitt C. Wilkerson, DMD, and E. Shanley Lestini, DDS, in their book, *The Shift, the Dramatic Movement toward Health Centered Dentistry*, children with OSA or upper airway resistance syndrome are often misdiagnosed with attention deficit hyperactivity disorder (ADHD). Young and middle-aged adults are frequently misdiagnosed with temporomandibular joint dysfunction. Middle-aged adults with OSA or upper airway resistance syndrome often show signs and symptoms that mimic dementia, challenges with memory and concentration, difficulty making decisions, and depression.¹

Risks of untreated obstructive sleep apnea

The dental professional must be aware of the multiple risks of untreated OSA and be able to share this information with patients who may have no idea of the serious consequences they face if sleep-disordered breathing isn't treated.

Hypertension: OSA increases risk for hypertension by 5.5 times. Multiple awakenings stress the body, causing hormone systems to go into overdrive, resulting in increased blood pressure.¹¹

Cardiovascular disease: People who suffer from OSA have a higher risk for heart attacks, strokes, and atrial fibrillation. OSA disrupts the way the body receives oxygen, which makes it difficult for the brain to control the blood flow to the brain and the arteries.¹²

Type 2 diabetes: OSA affects 80% or more people with type 2 diabetes. OSA alters glucose metabolism and promotes insulin resistance.¹³

Obesity: Excess weight increases the risk of developing OSA, and OSA makes weight loss difficult. Additionally, OSA is related to insulin resistance and causes the release of the hormone ghrelin, which increases cravings for sweets. Nocturnal awakenings and microarousals are connected to chronic cortisol release.¹⁴

Acid reflux: Up to 60% of patients who suffer from OSA also suffer from gastroesophageal reflux. More research is needed to determine the exact relationship, but studies have shown that treatment with a CPAP can improve acid reflux symptoms.¹⁵

Asthma: Studies confirm that OSA is an independent risk factor for exacerbation of asthma. Bronchoconstriction and gastroesophageal reflux have been suggested as mechanisms that can lead to worsening asthma in patients with OSA.¹⁶

Cancer: Intermittent hypoxia has been implicated in the increased incidence and more adverse prognosis of cancer.¹⁷

Auto and other accidents: Insufficient quantity and quality of sleep results in fatigue, increasing the risk of falling asleep at the wheel. People with sleep apnea are up to five times more likely to have traffic accidents.¹⁸

Depression: Depression and other mood disorders have been found to be common in those who experience excessive daytime sleepiness.¹⁹

Fibromyalgia: Fibromyalgia is a widespread pain and fatigue syndrome with an unknown etiology. People with fibromyalgia have a tenfold increase in sleep-disordered breathing, including OSA.²⁰

Chronic fatigue syndrome: Chronic fatigue syndrome is a disabling illness affecting approximately 0.2% of the US population.²¹ Disrupted sleep is a classic sign of chronic fatigue syndrome in patients reporting excessive daytime sleepiness, non-restorative sleep, difficulty falling asleep and staying asleep, and sleep disorders such as insomnia, narcolepsy, and OSA.

Reduced libido: OSA has been associated with altered pituitary-gonadal function, such as decreased testosterone and sexual dysfunction, manifested primarily as erectile dysfunction and decreased libido.²²

Dental screenings

The goal of dental screenings is to assess the patient for both sleep and awake symptoms. Certain criteria should automatically trigger a referral to a sleep physician for evaluation and diagnosis, including snoring, witnessed apnea, excessive daytime sleepiness, and the presence of medical co-morbidities such as hypertension, obesity, depression, gastroesophageal reflux, diabetes, and asthma.^{8,23}

Signs and symptoms²³

Mouth breathing: Most studies show that nasal breathing is ideal breathing, especially since the nose and the paranasal sinuses are the primary sites in which our bodies produce nitric oxide, which is critical for whole-body health.²⁴

Bruxism: Studies show that nearly one in four people with OSA exhibit nighttime bruxism. Some researchers believe that upper airway resistance causes an arousal, which increases stress throughout the body, leading to an increase in the activity of the muscles of mastication, resulting in bruxing. The movement of the jaw forward opens the airway and the person is able to take a breath. Another theory is that when the tissues of the upper airway collapse during episodes of snoring, partial, or complete apnea, the brain signals the jaw muscles to tighten, which stiffens the sides of the throat, preventing the collapse of the airway tissues.

Snoring: Chronic snoring is a sign of structural or functional pathology in the airway.

Poor sleep quality and daytime sleepiness: Multiple arousals and sleep fragmentation result in daytime sleepiness, ADHD, and bedwetting in children, morning headaches, joint pain, frequent trips to the bathroom, foggy thinking, temporomandibular joint dysfunction, muscle pain, and achy joints, among other conditions. A patient who falls asleep in the reception room or during dental treatment may well suffer from sleep-disordered breathing.

Nasal congestion: Undiagnosed and untreated allergy-related and nasal airway-related problems, such as sinus infections and deviated septum, can lead to sleep-disordered breathing. Nasal congestion and mouth breathing can signal sleep-disordered breathing.

Forward head posture: Forward head posture is associated with mouth breathing and with TMD and cervical neck pain, which can all be related to sleep-disordered breathing. Additionally, difficulty breathing in a supine position, as in the dental chair, may be a sign of sleep-disordered breathing.

Tongue tie: A short lingual frenum can decrease the size of upper airway support by the tongue and contribute to upper airway collapse.

Chronic cough: Chronic cough due to gastric reflux is closely associated with OSA.
Deviated septum: A deviation in the septum, which separates the two nostrils, can alter airflow through the nostrils, reducing the effectiveness of breathing through the nose, resulting in sleep-breathing difficulties.

Mallampati score >2: The Mallampati score involves visual assessment of the distance between the tongue and the roof of the mouth, which determines the amount of airway space. A higher score predicts the risk for OSA.

Scalloped tongue: When the dental arches are narrow, the tongue space is restricted and the tongue overlaps the teeth, resulting in indentations, or scallops, along the lateral borders of the tongue. This indicates restricted airway space. Tongue scallops may also appear as a result of the tongue being pushed forward against the teeth in an effort to open the airway.

Skeletal profile: Maxillary and/or mandibular skeletal underdevelopment, or narrow jaws, can compromise the airway space.

Screening guidelines

According to the American Academy of Dental Sleep Medicine, the following guidelines should be followed in screening adult dental patients for sleep-related breathing disorders.⁸

1. Review screening questionnaires, medical history, dental history, family history, and medications. Many medications may significantly impact the sleep schedule as well as sleep respiratory patterns.⁸
2. Record baseline blood pressure, neck circumference, and body mass index (BMI).
3. Evaluate oral and facial anatomic conditions, including maxillary and mandibular arch formation, pharyngeal crowding, sleep bruxism, and enamel erosion associated with gastroesophageal reflux.
4. Visualize the posterior pharyngeal wall, soft palate, uvula, and palatine tonsils. The Mallampati score and the Friedman tongue position classification are commonly used to evaluate these structures.²⁵
5. The primary site of upper airway obstruction occurs in the retropalatal tissues, so the nose should also be evaluated for possible obstructions. In the dental practice, we are restricted to questioning patients whether they are able to breathe well through the nose and if they are aware of nasal deviation. The patient should be referred to an ear, nose, and throat physician for evaluation if either the nasal or pharyngeal patency is compromised.⁸
6. Evaluate the tongue size, position, color, shape, and texture. A scalloped tongue is a highly significant sign in OSA.²⁶
7. Examine the temporomandibular joint as well as the masseter, temporalis, and sternocleidomastoid muscles. Any crepitus and pain should be noted. There may be an association between TMJ disorders and sleep-disordered breathing.²⁷
8. The tooth examination should include angle classification, overbite and overjet, evaluation of midlines, crossbites, wear facets, spacing, and crowding. Bruxism is a telltale sign of sleep-related breathing disorder and should be a red flag when you see occlusal wear facets, incisal wear, and mandibular and maxillary tori.
9. Home sleep tests (HST) measure the heart rate, airflow, the apnea-hypopnea index (AHI), oxygen saturation, respiratory effort, and sleep position.
10. Patient interviews that include a few simple questions can help identify possible OSA.

Assessment tools for obstructive sleep apnea

The Epworth Sleepiness Scale: This questionnaire can reveal how sleepy a patient feels during waking hours and can identify those who may be at risk for OSA.

The STOP-Bang questionnaire: This instrument asks about fatigue, snoring, and blood pressure, as well as measurements of body mass, neck size, age, and gender.

Berlin questionnaire: This questionnaire asks questions similar to the STOP-Bang.

Apps: There are now computer applications that can be used on smartphones and other smart devices that can track snoring and risks for OSA.

High-resolution pulse oximetry or heart rate variability, or a home sleep test: These professional tools collect overnight data to be analyzed by the dentist or physician.

Polysomnogram: This professional test is performed in a sleep lab.

Gathering all of this data will inform the examining dentist and dental hygienist of any need to refer the patient to a sleep physician.

Treatment²⁸

CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)

The standard treatment for OSA is continuous positive airway pressure, which involves using a device that delivers pressurized air through the nose, or nose and mouth, to the throat by way of a mask. That pressure keeps the throat from collapsing during sleep and enables normal breathing.

There are some people who don't tolerate a CPAP well. For those people, there are alternative treatments.

CPAP ALTERNATIVES

Orofacial myofunctional therapy (OMT):

OMT strengthens muscle weakness in the mouth, tongue, and the muscles of the oropharyngeal complex. It has been shown to reduce AHI and arousals, and to improve subjective symptoms of daytime sleepiness, sleep quality, and life quality.²⁹

Mandibular advancement appliance: The jaw is moved forward to increase upper airway space and reduce air resistance.

Nasal expiratory positive airway pressure (nasal EPAP): Prevents upper airway collapse by creating an airtight seal of the nostrils.

Oral pressure therapy: Application of negative pressure to the upper airway to reposition the tongue and soft palate.

Positional therapy: Special pillows help people remain on their sides during sleep, reducing airway obstruction.

Tonsillectomy and adenoidectomy: Removal of tonsils and/or adenoids if enlarged and contributing to airway restriction.

Uvulopalatopharyngoplasty (UP3): Removal of excess tissue in the soft palate to widen the airway and allow easier flow of air.

Genioglossus advancement (GGA): Recommended when the airway collapses behind the tongue. The mandible is moved forward, pulling the base of the tongue muscles forward to open the airway.

Inspire hypoglossal nerve stimulator: A monitor is implanted to deliver mild stimulation to airway muscles and move the tongue and other soft tissues away from the upper airway to enable improved breathing.

Maxillomandibular advancement (MMA) surgery: Shortened maxilla or mandible are lengthened and positioned forward to enhance the airway.

Maxillomandibular expansion (MME): This combination of orthodontic appliances and surgical intervention is used to enlarge the airway space and increase the intraoral space for the tongue.

Weight loss or bariatric surgery: Obesity may cause fatty tissue to build up around the throat and at the base of the tongue, impeding airway space. Weight loss may reduce fatty tissue and result in a more open airway.

Tongue reduction surgery: Reducing the size of the tongue may improve airflow and breathing.

Buteyko training and mouth taping: Breathing exercises and mouth taping are used to encourage nasal breathing.

Conclusion

As dentistry grows as a medical specialty, dentists and dental hygienists are tasked with ever-expanding roles. We must study areas of health that we never learned in dental and dental hygiene school. New research is being published and the standard of care continues to evolve. This is what keeps dentistry fresh, exciting, and challenging. We have increasing opportunities to elevate our identities as health-care professionals, to help our patients achieve higher levels of overall health, and to save lives.

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