The role of the dental team in the management of the patient with sleep apnea

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The evolution of the dental hygienist’s role in the assessment of a client’s oral health from a singular approach to a collaborative multidisciplinary approach is evident in the treatment of clients with sleep disorders. Knowledge of the variations in sleep disorders, medications, treatment needed, as well as the various appliances will be vital to the dental health-care providers. Pagel (2012) says that by 2015, 40 percent of the U.S. population will have some form of sleep disorder; 18 million Americans have sleep apnea, which affects all ages, both sexes and may be genetic. The most prevalent form occurs in 4 percent of middle-aged men and 2 percent of middle-aged women.1

What is obstructive sleep apnea syndrome?

Obstructive sleep apnea syndrome (OSAS) is a common, but under-diagnosed disorder that is potentially fatal.2 According to de Almeida et al. (2006),...
It happens most frequently during REM sleep, and breathing stops for 10 to 30 seconds, which results in reduced levels of oxygen dissolved in the blood. The patient with the OSAS does not know this is happening. A person’s quality and quantity of sleep is often inadequate. These interruptions of sleep can affect a person’s mental and physical state — and lead to additional problems in the oral cavity.

**What is central sleep apnea?**

Central sleep apnea is caused by the brain failing to signal the breathing-control muscles to work. With central sleep apnea, snoring is infrequent to rare because there is no airway obstruction. Though this disorder is less common than obstructive sleep apnea, it is important to address for the overall health of the sleeper. Oral appliances do not work in this situation. Central sleep apnea is diagnosed by sleep studies and typically treated with medications.

**What is complex sleep apnea?**

Complex sleep apnea is a combination of obstructive sleep apnea and central sleep apnea. Some patients with obstructive sleep apnea develop central sleep apnea while on treatment with continuous positive airway pressure (CPAP).

This article focuses on obstructive sleep apnea and how it relates to the oral cavity.

**Cause of obstructive sleep apnea syndrome**

Tongue muscles, soft palate and uvula relax and/or sag (Fig. 2), causing snoring, difficulty breathing and breathing cessation. Obesity, alcohol consumption and sleep medications can exacerbate the condition. Snoring and gasping for air causes the person to wake several times a night, preventing the person from getting the proper sleep needed to function.

Sleep apnea is often present in people who are overweight, have physical abnormalities such as a deviated septum or have other abnormalities of the nose or throat. The sleeper tries to breathe, creating a tighter seal, which decreases oxygen flow to the brain. The sleeper awakens gasping for air.

**Effects and oral effects**

Studies on sleep apnea are fairly new, and diagnostic evidence is evolving. Snoring is one of the symptoms of obstructive sleep apnea syndrome; however, not all individuals who snore necessarily have OSAS. Friedlander says, “Even when the airway is partially open, obstruction occurs frequently and results in a loud irregular snoring sound caused by air rushing through the narrow passage and stimulating the soft palate, uvula, throat walls and tongue to vibrate.” If an OSAS patient is left untreated, the condition can worsen over time. Risk can increase for hypertension, stroke, myocardial infarction, anoxic seizures and sudden death while asleep. Sleep apnea can be alleviated with oral devices and/or surgical procedures, however some complications have arisen in the oral cavity because of some of the devices used to correct or minimize obstructive sleep apnea.

**Signs and symptoms**

Dental professionals may be the first health-care providers to suspect possible OSAS in a patient because of signs and symptoms exhibited within the oral cavity. These include: “macroglossia (Fig. 3) and enlarged pharynx, narrowed posterior airway space resulting from a long soft palate by the uvula lying below the base of the tongue; the tongue lying above the mandibular plane of occlusion and small mandible.”

Signs and symptoms of OSAS while sleeping can include drooling, xerostomia, restlessness, bruxism, choking or gasping, snoring, breathing pauses and diaphoresis. But an individual’s symptoms associated with OSAS are not limited to sleeping problems. During waking hours the patient may experience depression, difficulty concentrating, fatigue and insomnia. Other signs can include gastroesophageal reflux disease (GERD), irritability and sleepiness throughout the day. Coughlin says, “If OSAS continues to be untreated or it is never diagnosed, the sleeping disorder may elevate blood pressure and the potential for mortality increases.”
_What to look for_

Maglioci says, “The population with OSAS is a heterogeneous group, and have a wide range of physical attributes. Not all patients with OSAS have all of these physical features.” The most common orofacial characteristics encountered include a retrognathic mandible, narrow palate, large neck circumference, long soft palate (which leads to dentists being unable to visualize the entire length of the uvula when the patient’s mouth is open wide), tonsillar hypertrophy, deviated nasal septum and relative macroglossia.

_Potential outcomes of non-treatment_

Patients with OSAS have interrupted sleep patterns because the obstruction of airflow causes prolonged interruptions in their breathing while they sleep (up to 40 seconds). Because the condition can lead to a reduction of oxygen in the blood stream, a host of medical complications can occur. Individuals with obstructive sleep apnea can experience worsening snoring, which is caused by vibration of the partially collapsed soft palate as air passes. Respiratory events, which deplete certain stages of non-REM and REM sleep, contribute to sleep fragmentation and unrefreshing sleep. Because of the lack of sleep, an OSAS sufferer may have difficulty concentrating and staying awake during the day. When sufferers sleep on their back, gravity pulls the jaw and tongue down and back. This causes the mouth to open and the tongue to drop back into the airway, narrowing the air passage.

_Treatments_

Oral devices and surgical intervention are the procedures used to treat OSAS. An oral appliance (Fig. 4) is a small acrylic device that fits over the upper and lower teeth or tongue (similar to an orthodontic retainer or mouth guard). This device slightly advances the lower jaw or tongue, which moves the base of the tongue forward and opens the airway. This improves breathing and reduces snoring and apnea. The appliance is fabricated and customized for each patient by a dentist experienced in the treatment of snoring and sleep apnea. The appliances are comfortable and well tolerated by patients. Appliances are easy to place and remove, easy to clean and are convenient for travel.

_Non-surgical treatments are available, including positional therapy_

The two main categories of oral appliances currently in use are the mandibular advancement devices (MAD) and the tongue retaining devices (TRD). The mandibular advancement devices, made of acrylic materials, are custom fabricated for each patient. The impression for the acrylic devices can be made in the dental office for lab fabrication. The devices fit comfortably over the upper and lower teeth, positioning the lower jaw slightly forward, advancing the tongue and soft tissues of the throat to open the airway. Some of the “repositioners are designed to hold the mandible anteriorinferiorly, constructed to position the mandible at 75 percent of the maximal mandibular advancement and within a 7 mm opening between upper and lower incisors” with no adverse effects to the temporal mandibular joint. The MADs have an adjustment mechanism built into the device, enabling users to gradually change the position of the bottom jaw under dental supervision to improve the effectiveness of the device.

Oral appliances used for OSAS patients cause a “mandibular advancement, including development of posterior open bite, altered inclination of incisors and decreased anterior open bite.” Through the use of various imaging techniques, research on appliances used for OSAS has identified various dental/skeletal changes that occur.

One of the most common effects, referenced in many studies, is the degree of vertical and horizontal overlap of the teeth (overjet and overbite, respectively). The adjustment mechanism makes it possible to position the device to best address a patient’s particular needs.

The tongue-retaining device is custom-made using a softer, pliable material with a compartment that fits around the tongue to hold it forward by means of suction. This device is used most for patients with dentures or patients who cannot adequately advance their lower jaw. Such patients must be able to breathe well through their nose, or they may have difficulty tolerating this appliance.
There are other recommended treatments, some involving behavioral therapy, that patients may be less likely to comply with, such as "non-supine sleep, [avoiding] late evening [food] consumption, weight loss, abstaining from drinking alcoholic beverages and a lifetime of required nightly use of continuous compressed air delivered by a CPAP (continuous positive airway pressure) machine via a nasal mask." The CPAP machines work when there is a compliant patient. If the patient is not compliant, there are other oral-appliance therapies that may be used, but CPAP remains the "gold standard" treatment for sleep apnea and the objective success rate of any other treatment must be judged against it. If a patient chooses oral devices over a CPAP machine, the dental team may be responsible for the fabrication of the oral devices.

_Surgical treatments_

Surgery is usually done in severe cases of OSAS or as an alternate or last-resort procedure. The main surgical treatments offered for OSAS often target the anatomical areas of the posterior airway where collapse is suspected to occur. Treatment is designed to enlarge the posterior airway space, reduce airway collapsibility and, ideally, stabilize the airway for the long term. Surgery has the advantage of correcting any craniofacial abnormalities that may be the cause of the OSAS and of removing the variable of patient compliance that is required with other long-term treatment strategies.

Obstructive sleep apnea syndrome sometimes occurs in patients with a retrognathic positioning of the mandible. People who have a receding chin related to a small lower jaw are more likely to snore because there is less room in the back of the throat for the soft tissues and tongue. This reduction in space decreases the size of the air passage and causes increased snoring.

Some patients undergo "maxilla-mandibular advancement surgery." Oral and maxillofacial surgeons engaging in corrective surgery communicate with the general dentist, because whenever an OSAS patient undergoes surgery, treatment plans need to be suspended in anticipation of changes to the patient’s occlusion. Hoffstein says, "Maxilla-mandibular advancement (MMA) surgery, which is based on traditional orthognathic surgery techniques, has been proven effective for a range of OSAS disease." Surgery allows the repositioning of the tongue. Additionally, de Almeida says, "These bone movements pull the base of the tongue forward and upward, thereby enlarging the posterior airway space, creating more anterior space for the tongue. The bony segments are fixed rigidly with screws and plates to assist in healing and to resist the pull of soft tissue that may cause skeletal relapse.

_Dental team’s role in identifying sleep apnea_

Obstructive sleep apnea requires appropriate diagnosis and treatment. Interdisciplinary communication is paramount when cases are handled by a team methodology. The dentist should work closely with other health-care professionals. Referral of patients to a physician indicates the dentist’s desire to make certain that the patient receives the best care possible. Dental professionals are crucial advocates involved in the management of OSAS and should be aware of the complications that can be caused by the disorder.

Asking questions about patients’ sleep habits can stimulate awareness for the general dentists and hygienist, enabling them to refer a patient to a physician who specializes in sleep disorders. Use of a standardized questionnaire similar to a medical history will ensure that every patient is screened for OSAS (see example in appendix). Identifying the underlying causes of OSAS and recommending an appropriate course of treatment can help patients maintain quality of life and reduce morbidity rates. Prinsell says, "This should be a working relationship between the medical community."

_Teamwork between dental and medical professions_

Patients with OSAS have a higher risk for hypertension, which can lead to other physical complications. Dental professionals working with physicians should be familiar with the medications and appliances used for sleep apnea and the oral complica-
Treatment for sleep apnea and snoring can help patients get the rest they need to reduce the medical complications and improve their function during the day. The dental team will be involved in monitoring any occlusal changes that result from mouth devices used in the sleep-disorder therapy.

When working with patients who have been prescribed an oral appliance, the dental hygienist needs to recommend mandatory dental visits as part of the treatment plan to keep a record of changes that might occur in the occlusal bite or to stay ahead of other dental problems that can occur because of use of the appliance. Magliocca and Helman say, “In addition to the patient's medical history, the dentist’s clinical examination findings influence treatment planning.”

It is also important to be aware that patients may be taking medication that creates xerostomic effects. Kalan and Kenyon say, “There are, also, certain types of CPAP delivery that may add to the patient’s complaints of xerostomia.” Medications may sometimes be used to treat depression experienced by some patients with OSAS. These medications may contribute to causing the oral cavity to be dry. Patients also might begin to neglect daily oral hygiene. Dentists and hygienists should recommend and prescribe artificial saliva products and regular fluoride applications for patients with xerostomia who are using the CPAP devices. While the incidence of caries has not been reviewed in the OSAS population, it would seem especially prudent to educate patients with xerostomia about avoiding cariogenic foods and beverages.

Dental professionals need to be aware of the impact certain surgery procedures within the oral cavity can have on patients who are using a CPAP machine. For example, Kapur says, “Reflecting a mucoperiosteal flap to accomplish surgical extractions or other procedures may preclude the patient from using CPAP for one to two evenings to avoid the possible risk of developing subcutaneous emphysema.”

Because occlusal changes can occur with OSAS therapy, communication between the patient, dentist, hygienist and the physician who prescribed the oral appliance is essential. Some patients may not notice or may not be affected by changes in their occlusion while using an oral appliance, but problems may still exist. Robertson et al. suggest “keeping the patient’s bite opening to a minimum when fabricating an appliance to reduce the impact on the occlusion.” When restorative work is be done on OSAS patients, such as crowns or fillings, adjustments to the existing appliance — or fitting of a new appliance — may be needed. The process of adjusting or creating a new appliance needs to be done with the oral surgeon or physician who prescribed the oral device.

The prevalence of OSAS may be higher than estimated, and medical and dental health-care professionals can “offer these patients the full range of available treatment options to defeat this often fatal illness.” Adding sleep-related questions to the written or oral medical history and consideration of both orofacial and physical findings may result in the detection of a sleep disorder. Dental hygienists can ask questions, such as: “How many pillows do you sleep with? Does your spouse complain that you snore? Are you grinding or clenching? Do you wake up with headaches in the morning? Do you wake up with a dry mouth?” The routine oral assessment that hygienists provide can aide in recognizing conditions pertaining to OSAS. Hygienists can facilitate the management of the patient with sleep apnea by recommending oral care products to reduce xerostomia and to reduce inflammation of gingiva for sleep apnea patients who snore. Dental health-care professionals should refer patients to physicians who manage OSAS patients on a regular basis.

Dental hygienists see patients frequently and often on a routine bases, so they are often the first to observe variations in the oral cavity. Cooperation between hygienists and dentists and medical health-care professionals who treat patients with OSAS creates an advantage to the patient for overall health care.

Treatment plans for patients with sleep apnea and sleep disorders, along with the associated medications being used by such patients, should be included in the medical history in the patient’s charts. This will ensure the dental team is aware of any changes in the oral cavity and is monitoring for potential conditions associated with medications being used to treat sleep disorders.
Patients answering yes to any of the following questions may need to be referred to a sleep physician.

- Do you snore?
- Have you ever been diagnosed with high blood pressure?
- Has there been any witnessed stopping of breathing or gasping for breath during sleep?
- Do you know your neck size? If so, is it more than 17 inches for men or 15 inches for women?
- Have you ever been told to use a CPAP or breathing machine while sleeping?
- Do you and your partner sleep in separate rooms because of your loud snoring?
- Do you doze off unintentionally during the day?
- Do you often wake up feeling tired or having a headache?
- Do you have problems concentrating for long periods of time?

References