



SLEEP APNEA:
Is YOUR PATIENT
AT RISK

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SLEEP APNEA: IS YOUR PATIENT AT RISK?

DEFINITION AND PREVALENCE

Sleep apnea is a serious, potentially life-threatening condition. It is a breathing disorder characterized by repeated collapse of the upper airway during sleep, with consequent cessation of breathing. Virtually all sleep apnea patients have a history of loud snoring. They may also unknowingly experience frequent arousals during the night, resulting in chronic daytime sleepiness or fatigue.

There are two discrete types of sleep apnea: central and obstructive. Central sleep apnea, characterized by a lack of airflow in the absence of ventilatory effort, is rare. Obstructive sleep apnea is much more common and is referred to as sleep apnea hereafter. It is characterized by closure of the upper airway, resulting in the cessation of airflow despite persistent ventilatory effort. Apnea is defined as cessation of airflow for more than 10 seconds. A related event, hypopnea, is characterized by a reduction in airflow associated with a decrease in oxygen saturation. The average number of apnea-hypopnea events per hour of sleep is called the apnea-hypopnea index (AHI). Adults may experience up to five events per hour without symptoms. In general, as AHI increases, so does the severity of symptoms. An AHI of five or greater in combination with self-reported hypersomnolence is indicative of the sleep apnea syndrome.¹

Sleep apnea appears to be as common as some better known diseases. It is estimated that 4 percent of middle-aged men and 2 percent of middle-aged women meet minimal criteria for sleep apnea syndrome.¹ This compares to a 4.5 percent prevalence of asthma in middle-aged adults.² Sleep apnea is more prevalent among the obese, in males, and in older individuals.³ There also seems to be a higher prevalence of sleep apnea in the hypertensive population.

CONSEQUENCES AND COMORBIDITY

From a behavioral standpoint, sleep apnea patients usually experience but may or may not report tiredness, fatigue, sleepiness, memory and judgment problems, irritability, difficulty concentrating, and personality changes.⁴ Patients with sleep apnea are more likely to fall asleep at inappropriate times and have a higher rate of automobile crashes⁵ and work-related accidents.⁴

The cardiovascular system is also adversely affected by sleep apnea. Systemic hypertension has been reported in up to 50 percent of patients with sleep apnea.⁶ Mean morning blood pressure has been shown to increase almost linearly with increasing apneic activity in both obese and nonobese individuals.⁷ Cardiac arrhythmias during sleep have also been associated with sleep apnea. Usually bradyarrhythmias are observed,⁸ although ventricular tachycardia is noted occasionally in cases of severe hypoxemia.⁹ It is possible that sleep apnea contributes to myocar

dial ischemia, and even myocardial infarction, in patients with coronary artery disease.¹⁰

A small subset of patients with severe sleep apnea could be characterized as having the Pickwickian Syndrome (also known as obesity-hypoventilation syndrome), which consists of daytime hypercapnia and hypoxemia, pulmonary hypertension, polycythemia, and cor pulmonale.¹¹

IDENTIFICATION OF PATIENTS AT RISK FOR SLEEP APNEA

Patients at high risk for sleep apnea are those who exhibit loud, chronic snoring. If it can be confirmed that the patient does not snore, sleep apnea is unlikely. On the other hand, patients who are observed to have apneic events characterized by choking or gasping during sleep are definite candidates for further evaluation. Bed partners or family members will likely need to be

interviewed in order to obtain accurate information about snoring and apneic events.

Obesity, particularly upper body obesity, is a risk factor for sleep apnea and has been shown to have a significant effect on its severity.¹² Most sleep apnea patients are obese, when obesity is defined as greater than 120 percent of ideal body weight.¹³ Large neck girth in both male and female snorers is highly predictive of sleep apnea.¹⁴ In general, men with a neck circumference of 17 inches or greater and women with a neck circumference of 16 inches or greater are at a higher risk for sleep apnea.¹⁵

Other signs and symptoms that can help identify patients at risk for sleep apnea are hypertension, excessive daytime sleepiness (especially dozing off while driving), automobile or work-related accidents, and otherwise unexplained pulmonary hypertension or cor pulmonale. See table 1.

TABLE 1

PATIENTS AT RISK FOR SLEEP APNEA
SYMPTOMS
■ Chronic, loud snoring
■ Gasping or choking episodes during sleep
■ Excessive daytime sleepiness (especially drowsy driving)
■ Automobile or work-related accidents due to fatigue
■ Personality changes or cognitive difficulties related to fatigue
SIGNS
■ Obesity, especially nuchal obesity (neck size ≥ 17 inches in males, ≥ 16 inches in females)
■ Systemic hypertension
■ Nasopharyngeal narrowing
■ Pulmonary hypertension (rarely)
■ Cor pulmonale (rarely)

If a patient complains of sleepiness but does not have other signs and symptoms suggestive of sleep apnea, a review of sleep habits may be helpful (e.g., how many hours of sleep the patient averages per night, recent changes in schedule, recent lifestyle changes). The patient may simply need to consider ways in which to increase the daily amount of sleep. If the patient is getting sufficient sleep, then other conditions such as narcolepsy or depression should be considered.

Sleep apnea is also seen in children. Tonsillar hypertrophy is the most common cause. Children with sleep apnea may exhibit different signs and symptoms than adults. During sleep, children exhibit snoring and labored breathing. Features compatible with sleep apnea include weight loss or failure to gain weight, poor school performance, secondary enuresis, and behavioral problems.¹⁶⁻¹⁸

DIAGNOSIS

If there is a high suspicion of sleep apnea after evaluating a patient, a sleep study is indicated to establish a diagnosis. Currently, polysomnography, which requires an overnight stay in a sleep laboratory, is the optimum test for diagnosing sleep apnea. It includes evaluation of sleep staging, airflow and ventilatory effort, arterial oxygen saturation, electrocardiogram, body position, and periodic limb movements. Polysomnography, however, may not be readily available. Other options to consider are evaluation using pulse oximetry and portable (home) monitoring of cardiopulmonary channels. Although oximetry is currently being used to diagnose sleep apnea, its sensitivity and specificity are controversial.¹⁹ A variety of home monitors are currently available or being developed that can record both cardiopulmonary parameters (for example, airflow, ventilatory effort, heart rate, and oxygen saturation) and sleep parameters and may be useful in diagnosing sleep apnea.

It is imperative that a sleep study be interpreted by someone with expertise in sleep disorders since an accurate diagnosis is crucial to avoid undertreatment or overtreatment of patients.

The severity of symptoms will determine how quickly a sleep study should be obtained and therapy initiated. Patients who report falling asleep while driving or those with heart failure or angina are *high priority* for a sleep study and rapid intervention. Symptom severity along with availability of resources will determine the type of study and referral options.

TREATMENT OPTIONS

The goals of treatment for sleep apnea patients include both physiologic and symptomatic components. Physiologic goals of treatment include eliminating sleep fragmentation, apneas and hypopneas, and oxygen desaturation. Symptomatic goals include eliminating snoring and sleepiness, improving quality of life, and reducing or eliminating comorbidities. Symptomatic improvement, particularly decreased snoring, does not necessarily correlate with physiologic improvement or decreased morbidity.

Therapy decisions must be individualized and are often accomplished in consultation with sleep apnea specialists. See table 2.

BEHAVIORAL APPROACHES

Behavioral measures may be the only treatment needed for patients with mild sleep apnea. Behavioral interventions include losing weight, eliminating evening alcohol and sedatives, and proper positioning (avoiding the supine position in bed). Although weight loss (accomplished through a comprehensive program or surgery) may be difficult to achieve, it can be very effective and, in some cases, even curative.^{20,21}

TABLE 2

TREATMENT OF SLEEP APNEA

- Modification of behavioral factors
 - Weight loss (including exercise regime)
 - Avoidance of alcohol and sedatives before sleep
 - Avoidance of supine sleep position
- Nasal CPAP
 - Noninvasive
 - Very effective
 - Patient adherence variable
- Oral/dental devices
 - May be useful in mild-to-moderate cases
 - Not uniformly effective
- Surgical procedures (UPPP, nasal surgery, tonsillectomy, LAUP, maxillofacial surgery, tracheostomy)
 - Invasive
 - Not uniformly effective
 - May carry risk
 - Repeat sleep study is necessary after each procedure

Patients with mild symptoms may experience improvement using behavioral techniques alone. Appropriate behavioral treatment should be implemented for all patients, even those requiring additional interventions.

Patients treated with behavioral techniques should be reevaluated periodically after initiation of treatment. For patients who have improved, continued support and positive reinforcement can sustain their adherence and success. In those patients who continue to experience symptoms, other therapies are warranted.

NASAL CONTINUOUS POSITIVE AIRWAY PRESSURE

Continuous positive airway pressure (CPAP) is the most effective noninvasive therapy for sleep apnea. To use CPAP, the patient must wear a sealed mask over the nose or, in some cases, over the nose and mouth during sleep.²² The mask is connected to a blower forcing air through the nasal passages. CPAP acts as a pneumatic splint by increasing the pressure in the oropharyngeal airway, thereby maintaining airway patency throughout the ventilatory cycle.²³ This treatment is usually prescribed after polysomnography has first determined the therapeutic level of

CPAP pressure required to reduce or eliminate sleep apnea.²⁴ CPAP is effective in reversing daytime somnolence and eliminating cardiopulmonary sequelae.²⁵ CPAP, used properly, produces rhythmic breathing, resulting in the patient feeling dramatically better and being able to function more efficiently. Compared with no treatment or other treatment modalities, patients treated with CPAP have a lower mortality rate.²⁶

Although very effective, CPAP may be difficult for some patients to use.²⁷ Adherence to CPAP treatment varies greatly but tends to be higher in patients with severe symptoms.²⁸ The most common reasons for discontinuing CPAP are intolerance of the mask, nasal-related complaints, and the inconvenience of being connected to a machine. Common side effects include nasal stuffiness, rhinitis, facial skin discomfort, and discomfort with the pressure. Humidifiers, nasal steroids or decongestants, intranasal anticholinergics, or different masks may relieve side effects. Variations in pressure application have been developed to offer patients options for improving comfort. Assisting patients to focus on symptom reversal and working with home care companies to ensure proper-fitting and effective equipment will enhance adherence.

Followup after the first month of CPAP treatment should include checking the status of equipment, assessing patient symptoms and adherence, and assessing the status of coexisting conditions such as hypertension. In patients who have achieved significant weight loss, the CPAP pressure may need to be adjusted. If the patient reports continued snoring, the pressure may need to be increased.

ORAL/DENTAL APPLIANCES

Oral or dental appliances may be an option for patients with mild-to-moderate sleep apnea. However, they are not effective in all patients.

Appliances have also been used for patients who snore but do not have sleep apnea. There are various devices that displace the tongue forward or move the mandible to an anterior and forward position to improve patency of the airway.²⁹ Reported side effects of the devices include excessive salivation and temporomandibular joint discomfort. A dentist or orthodontist experienced in the use of these devices should fit the patient, and a sleep study should be done after the device is fitted to evaluate its effectiveness.

SURGICAL PROCEDURES

Patients need to understand that no surgical procedure has universal success, and all are invasive and carry risk. Several procedures or a combination of procedures may need to be performed to help sleep apnea patients. It is important that sleep studies be repeated after each surgical procedure to confirm its effectiveness, once there is evidence of adequate healing. When weighing treatment options, it may be useful to let the patient know that CPAP is highly effective when used properly and is safe and reversible.^{26,30}

Uvulopalatopharyngoplasty (UPPP). During UPPP, an inpatient procedure, the uvula and portions of the soft palate are resected to widen the oropharyngeal airway. Although snoring is temporarily relieved in most cases, apnea may persist. The overall success rate of UPPP is reported to be about 40 percent (when success is defined as achieving an AHI of less than 20).³¹ It is difficult to predict which patients will benefit from this procedure, and long-term side effects and benefits are unknown.

Nasal Surgery. Nasal surgery may be used alone or in conjunction with other procedures. However, it is rarely curative alone.

Tonsillectomy. In children and adolescents adenotonsillectomy may be useful, even curative.³² Tonsillectomy alone in adults is not usually helpful³³ but is often done in conjunction with UPPP.

Laser-Assisted Uvulopalatoplasty (LAUP). LAUP has received much attention recently as a treatment for snoring. However, its effectiveness in treating sleep apnea is unknown. LAUP differs from traditional UPPP in both surgical technique and setting (office-based). LAUP excises only part of the uvula and associated soft-palate tissues. The resultant shortening of the palate and reduction of the uvula may reduce, alter, or eliminate snoring. As with UPPP, relief of snoring may occur without improvement in apneic events. Therefore, patients who elect LAUP for snoring may risk delaying the diagnosis of sleep apnea because snoring, a primary symptom, is eliminated.³⁴

Maxillofacial Surgery (Genioglossal Advancement, Maxillary and Mandibular Advancement). These are specialized procedures that are currently not widely available, although they appear to be effective in treating sleep apnea.²⁵ Genioglossal advancement enlarges the airway at the base of the tongue. This procedure may be combined with a UPPP. Maxillary and mandibular advancement enlarges the airway at the level of the soft palate as well as the tongue.

Tracheostomy. Tracheostomy is highly successful in eliminating sleep apnea but is very invasive, both physically and psychologically. This procedure is reserved for severe cases where other treatments have failed.

PHARMACOLOGICAL TREATMENT

Currently, there are no safe and effective medications indicated in the routine treatment of sleep apnea.

OXYGEN

Administration of supplemental oxygen may improve nocturnal desaturation but is not a satisfactory treatment option by itself³⁵ because it does not reduce sleep disruption and subsequent daytime sleepiness.³⁶

MANAGEMENT CONSIDERATIONS

The efficacy of a chosen treatment modality should be periodically and objectively verified. Sleep apnea patients who undergo surgical interventions need to have sleep studies repeated postoperatively, after healing has occurred. Once effective treatment has been initiated, all patients should be periodically reevaluated for recurrence of symptoms such as snoring and excessive daytime sleepiness as well as cardiopulmonary complications. The primary care physician can play a key role in determining if patients are adhering to treatment and in monitoring comorbidities such as hypertension and coronary artery disease. For example, hypertension treatment may need to be adjusted once sleep apnea has improved. Patients who are adherent to treatment for sleep apnea need positive reinforcement, and those who are not adherent may require different treatment options. Patients who are on CPAP need to have their equipment evaluated periodically to ensure that the machine and mask are functioning properly.²³ If, however, symptoms of sleepiness persist despite apparently adequate treatment, the patient should be evaluated for other conditions.

WHERE TO GET MORE INFORMATION

- **National Center on Sleep Disorders Research (NCSDR).** The NCSDR, located in the National Heart, Lung, and Blood Institute, supports research, scientist training, dissemination of health information, and other activities on sleep disorders and related concerns. The NCSDR also coordinates sleep research activities with other Federal agencies and with public and nonprofit organizations.

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- **National Heart, Lung, and Blood Institute Information Center.** The Information Center acquires, analyzes, promotes, maintains, and disseminates programmatic and educational information related to sleep disorders and sleep-disordered breathing. Write for a list of available publications or to order additional copies of this brochure.

NHLBI Information Center
P.O. Box 30105
Bethesda, MD 20824-0105
(301) 251-1222
(301) 251-1223 (fax)

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