

## Q: Obstructive sleep apnea: Who should be tested, and how?

**A:** Patients who have risk factors for obstructive sleep apnea (OSA) or who report symptoms of OSA should be screened for it, first with a complete sleep history and standardized questionnaire, and then by objective testing if indicated. The gold standard test for OSA is polysomnography performed overnight in a sleep laboratory. Home testing is an option in certain instances.

Common risk factors include obesity, resistant hypertension, retrognathia, large neck circumference (> 17 inches in men, > 16 inches in women), and history of stroke, atrial fibrillation, nocturnal arrhythmias, heart failure, and pulmonary hypertension. Screening is also recommended for any patient who is found on physical examination to have upper-airway narrowing or who reports symptoms such as loud snoring, observed episodes of apnea, gasping or choking at night, unrefreshing sleep, morning headaches, unexplained fatigue, and excessive tiredness during the day.

The American Academy of Sleep Medicine suggests three opportunities to screen for OSA<sup>1</sup>:

- At routine health maintenance visits
- If the patient reports clinical symptoms of OSA
- If the patient has risk factors.

### ■ A DISMAL STATISTIC

The prevalence of OSA in the United States is high, estimated to be 2% in women and 4% in men in the middle-aged work force,<sup>2</sup> and even more in blacks, Asians, and older adults.<sup>3</sup> Yet only 10% of people with OSA are diagnosed<sup>4</sup>—a dismal statistic considering the association of OSA with resistant hyperten-

sion<sup>5</sup> and with a greater risk of stroke,<sup>6</sup> cardiovascular disease, and death.<sup>7</sup>

### ■ CONSEQUENCES OF UNTREATED OSA

Untreated OSA is associated with a number of conditions<sup>7</sup>:

- **Hypertension.** OSA is one of the most common conditions associated with resistant hypertension. Patients with severe OSA and resistant hypertension who comply with continuous positive airway pressure (CPAP) treatment have significant reductions in blood pressure.
- **Coronary artery disease.** OSA is twice as common in people with coronary artery disease as in those with no coronary artery disease. In patients with coronary artery disease and OSA, CPAP may reduce the rate of nonfatal and fatal cardiovascular events.
- **Heart failure.** OSA is common in patients with systolic dysfunction (11% to 37%). OSA also has been detected in more than 50% of patients with heart failure with preserved systolic function. CPAP treatment can improve ejection fraction in patients with systolic dysfunction.
- **Arrhythmias.** Atrial fibrillation, nonsustained ventricular tachycardia, and complex ventricular ectopy have been reported to be significantly more common in people with OSA.<sup>8</sup> If the underlying cardiac conduction system is normal and there is no significant thyroid dysfunction, bradyarrhythmias and heart block may be treated effectively with CPAP.<sup>7</sup> Treatment of OSA may decrease the incidence and severity of ventricular arrhythmias.<sup>7</sup>
- **Sudden cardiac death.** OSA was independently associated with sudden cardiac death in a longitudinal study.<sup>9</sup>

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TABLE 1

**The STOP-Bang questionnaire for obstructive sleep apnea**

**Snoring.** Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?

**Tired.** Do you often feel tired, fatigued, or sleepy during the daytime?

**Observed.** Has anyone observed you stop breathing during your sleep?

**Pressure.** Do you have or are you being treated for high blood pressure?

**Body mass index greater than 35 kg/m<sup>2</sup>?**

**Age over 50?**

**Neck circumference larger than 40 cm?**

**Gender—male?**

Score 1 for each yes answer. A score < 3 indicates low risk of obstructive sleep apnea. A score ≥ 3 indicates moderate to high risk.

Based on information in reference 13.

Sleep apnea is associated with glucose intolerance and insulin resistance

- **Stroke.** The Sleep Heart Health Study<sup>6</sup> showed that OSA is 30% more common in patients who developed ischemic stroke. Long-term CPAP treatment in moderate to severe OSA and ischemic stroke is associated with a reduction in the mortality rate.<sup>10</sup>
- **Diabetes.** The Sleep Heart Health Study showed that OSA is independently associated with glucose intolerance and insulin resistance and may lead to type 2 diabetes mellitus.<sup>11</sup>

■ **A QUESTIONNAIRE HELPS IDENTIFY WHO NEEDS TESTING**

If you suspect OSA, consider administering a sleep disorder questionnaire such as the Berlin,<sup>12</sup> the Epworth Sleepiness Scale, or the STOP-Bang questionnaire (Table 1). The STOP-Bang questionnaire is an easy-to-use tool that expands on the STOP questionnaire (snoring, tiredness, observed apnea, high blood pressure) with the addition of body mass index, age, neck size, and gender. The Berlin questionnaire has been validated in the primary care setting.<sup>12</sup> The STOP-Bang questionnaire has been validated in preoperative settings<sup>13</sup> but not in the primary care setting (although it has been commonly used in primary care).

■ **WHICH TEST TO ORDER?**

If the score on the questionnaire indicates a moderate or high risk of OSA, the patient should undergo objective testing with polysomnography or, in certain instances, home testing.<sup>1</sup> Polysomnography is the gold standard. Home testing costs less and is easier to arrange, but the American Academy of Sleep Medicine recommends it as an alternative to polysomnography, in conjunction with a comprehensive sleep evaluation, only in the following situations<sup>14</sup>:

- If the patient has a high pretest probability of moderate to severe OSA
- If immobility or critical illness makes polysomnography unfeasible
- If direct monitoring of the response to non-CPAP treatments for sleep apnea is needed.

Home testing for OSA should not be used in the following situations:

- If the patient has significant morbidity such as moderate to severe pulmonary disease, neuromuscular disease, or congestive heart failure
- In evaluating a patient suspected of having comorbid sleep disorders such as central sleep apnea, periodic limb movement disorder, insomnia, parasomnias, circadian rhythm disorder, or narcolepsy
- In screening of asymptomatic patients.

Home testing has important drawbacks. It may underestimate the severity of sleep apnea. The rate of false-negative results may be as high as 17%. If the home test was thought to be technically inadequate or the results were inconsistent with those that were expected—ie, if the patient has a high pretest probability of OSA based on risk factors or symptoms but negative results on home testing—then the patient should undergo polysomnography.<sup>14</sup>

■ **DIAGNOSIS**

The diagnosis of OSA is confirmed if the number of apnea events per hour (ie, the **apnea-hypopnea index**) on polysomnography or home testing is **more than 15**, regardless of symptoms, or more than 5 in a patient who reports OSA symptoms. An apnea-hypopnea index of 5 to 14 indicates mild OSA, 15 to 30

indicates moderate OSA, and greater than 30 indicates severe OSA.

#### ■ BENEFITS OF TREATMENT

Treatment of OSA with CPAP reduces the 10-year risk of fatal and nonfatal motor

vehicle accidents by 52%, the 10-year expected number of myocardial infarctions by 49%, and the 10-year risk of stroke by 31%.<sup>7</sup> It has also been found to be cost-effective, for men and women of all ages with moderate to severe OSA.<sup>15</sup> ■

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