

# Sleep Disorder Breathing : A Wakeup Call

**Dr. Naresh Sharma**  
Asst. Professor

**Dr. Nipun Dhalla**  
Asst. Professor

Dept. of Pedodontics & Preventive Dentistry, Manav Rachna Dental College, Faridabad

**S**leep-disordered breathing is defined as abnormal breathing patterns that disrupt sleep<sup>1</sup>. There are several types of sleep-disordered breathing patterns including hypopneas, apneas, and respiratory effort related arousals. Apnea is defined as a cessation of airflow for 10 or more seconds<sup>2,3</sup>. Partial obstructive events called Hypopnea have historically been defined differently by different sleep disorders centers and sleep specialists. Because of a lack of uniformity in definitions, and partly because of difficulties in diagnosing and treating Medicare patients, the American Academy of Sleep Medicine has recently redefined hypopneas as abnormal respiratory events lasting at least 10 seconds, with at least a 30% reduction in airflow or thoracoab-dominal movement with at least a 4% oxygen desaturation. The associated arousals historically associated with hypopneas have now been eliminated from the definition. This new definition is based on epidemiological data relating to sleep-related breathing disorders and cardiac disease<sup>2</sup>. The data relating to obstructive sleep apnea syndrome, and to both cardiovascular and Cerebrovascular disease is growing. Another abnormal breathing pattern is termed upper airway resistance syndrome. It is diagnosed in patients who present with daytime sleepiness caused by a narrowing or increased resistance of their upper airway when sleeping without diagnosable apneas or hypopneas. These patients generally have brief electroencephalography (EEG) arousals that may fragment sleep and cause the complaint of daytime sleepiness<sup>4</sup>. Common characteristics of patients who present for an apnea consultation include obesity, sleepiness, snoring, snorting, gasping, choking, and witnessed apneas at night. Hypertension, nocturia, and morning headaches may also be experienced.

## Patterns of Apnea

There are three typical patterns of apnea. Obstructive apnea is the absence of airflow despite respiratory effort<sup>2,3</sup>. Central apnea is an absence of airflow with no respiratory effort. Mixed apnea includes both a central and an obstructive component. The most typical mixed apnea pattern is a central component

followed by an obstructive component. Evaluation Sleep-disordered breathing is best evaluated by a sleep consultation with a board-certified sleep specialist followed by polysomnography if indicated. Screening tests will be discussed later. The consultation should include a full history and physical examination. The history should include, but is not limited to, a thorough discussion of the nature of the patient's complaint. Often, it is also helpful to interview either the bed partner or an observer. These persons are a rich source of information even though there sometimes may be disagreement between the two individuals. It may be helpful to ask if the observer is a heavy sleeper or not. There is an obvious problem if the patient sleeps alone. If it is not possible to directly interview the observer either in person or by telephone, it is often informative to at least have the bed partner or observer complete a questionnaire regarding the sleep habits and sleep symptoms of the patient. The level of sleepiness should be addressed. This can be done by asking the patient, bed partner, or observer about sleepiness or administering a self report measure such as the Epworth Sleepiness Scale.

Attention should be directed to driving sleepiness in all cases, but especially when the patient is a truck driver or conveys passengers. If significant sleepiness is present, some sleep disorders centers conduct a Multiple Sleep latency Test or a Maintenance of Wakefulness Test to assess the patient's level of sleepiness more objectively. These tests are almost always conducted the day following polysomnography and are not central to the topic of this article. Sleep issues should be addressed including bedtime and arising times as well as activities that precede sleep periods. Sleep hygiene issues including caffeine, alcohol, and nicotine should also be addressed. These issues are often crucial to a thorough sleep evaluation. Take the example of a patient who presents with reported snoring and profound sleepiness. On closer questioning, he reveals that he works two jobs and only chronically sleeps 34 hours in a 24-hour period.

Before the ordering of a polysomnogram, the patient should be asked to spend more time

in bed for 2 weeks to ascertain if this helps both sleepiness and snoring. As a bonus, snoring may be improved with increased sleep because some patients report dramatically more snoring when fatigued. Symptoms present during sleep should be addressed.

These symptoms should include but not necessarily be limited to areas such as morning headaches, frequency and level of snoring, witnessed apnea episodes, dry mouth, drooling, tossing and turning, night sweats, and nocturia. The family sleep and medical history should be taken. Patients often report a generational pattern of snoring and sleepiness, and the family medical history often reveals a strong history of cardiac and cerebrovascular disease.

Of course, the medical history of the patient should be reviewed. A limited social history may be relevant, including such factors as work and marital history. If sleep-related breathing problems are severe enough, both of these areas can be affected. Patients will sometimes disclose that they have been terminated from work or are about to be terminated because of their sleepiness. Some patients will report that their marital situation has been affected because of marital conflict brought on by the loudness of their snoring. A general physical examination should be performed with special emphasis on the nasal and oral areas. Cephalometric may be useful to identify the relationships among the soft tissues and the bony structures of the upper airway. The chief problem of the apnea patient is a small airway. This may be related to fatty deposits, tonsillar hypertrophy, or a small or retro placed mandible<sup>5</sup>. Despite the continued ordering of thyroid levels on all patients by some sleep experts, there are no data showing that a thyroid level is an important laboratory value for the overall sleep consultation<sup>6</sup>. Beside weight and height, a measure of neck circumference is important. Men with a neck circumference of 17 inches or higher, and women with a neck circumference of 16 inches or higher, are at increased risk for the presence of obstructive sleep apnea<sup>7</sup>. Blood pressure should also be taken. If standard polysomnography is indicated, some care should be taken to orient the patient to what the test will entail. Most patients are asked to

The advertisement features a central image of a modern dental chair with a yellow seat and backrest, surrounded by various dental instruments and equipment. The background is a light blue and white grid pattern. On the left side, there is a logo for 'Olsen' with the tagline 'The Innovation has this brand'. On the right side, there is a logo for 'dentomed healthcare' with the website 'www.dentomedhc.com' and a phone number '+91-9654350641, 9560223355'. The overall design is clean and professional.

arrive at the sleep disorders center about 2 hours before their customary bedtime. They are typically asked to complete several questionnaires about their various activities during the day. Patients are asked to list their medications and are often given screening psychological tests for depression and/or anxiety or may be given a Minnesota Multiphase Personality Inventory (MMPI) for a broader psychological profile. Then about 20 sensors are attached to the patient, with most of the sensors going on the head and face, and the remainder on the torso and legs. A pulse oximeter is generally placed on the finger, ear, or toe.

Patients should be informed that they will be monitored continuously both by video and audio, and appropriate releases should be obtained. Most patients are concerned about how they will be able to get up to go the bathroom, and the process for this should be explained. No electrodes need to be removed for bathroom breaks but the patient is merely unplugged from the monitoring equipment and can then move about freely. Many patients are concerned about whether or not a person could fall asleep under these circumstances. They should be reassured that the typical patient falls asleep quickly with no pharmacological help. It is also important for patients to be informed about the range of treatment options available and the relative efficacy of each. The positive and negative aspects of each treatment alternative should be reviewed with the patient. If split-night (to be discussed later) studies are used, the criterion and procedures should be carefully explained.

#### Screening Tests

Home studies may be generally divided into three areas: unattended portable recordings in the home, attended portable recordings in the home, and home pulse oximeter. The American Academy of Sleep Medicine recommends standard polysomnography as the accepted test for diagnosis of sleep-related breathing disorders. An attended home study that uses the same parameters as standard polysomnography is an acceptable way to evaluate sleep-related breathing disorders<sup>8</sup>.

The definition of "attended," however, may vary widely from a technologist actually in the home overnight with the patient to remote monitoring of the patient. This controversy has not been settled. But the patient needs to be observed in real time in order to ensure the quality of the recording and his or her safety. The American Academy of Sleep Medicine generally views unattended portable recordings as an acceptable alternative only in situations such as when there are indications that the breathing disorder may be severe and standard polysomnography is not readily available. Other circumstances include the patient's inability to be studied in the sleep laboratory or as a follow-up study when diagnosis has been made by standard polysomnography and therapy initiated<sup>9</sup>. The intent here is to verify that the treatment is working. Common therapies that are usually followed in this

manner are nasal continuous positive airway pressure (nasal CPAP), a mandibular repositioning appliance (oral appliance), or surgical intervention. Home pulse oximeter has been extensively used as a screening tool. There is only a weak correlation, however, between the results of home pulse oximeter and standard polysomnography. Home pulse oximeter may be useful when there is a long waiting list for standard polysomnogram and strong indications that the sleep-related breathing disorder may be severe<sup>9</sup>. Beside a weak correlation between home pulse oximeter and standard polysomnography, it is often difficult if not impossible to ascertain whether the variations in oxygenation are a result of apnea or the result of changes in body position or leg movements. Furthermore, it is impossible to differentiate REM from non-REM, or even to tell if the patient is asleep at all. If a patient is symptomatic enough to warrant a home pulse oximeter study, what is the referring physician to do if the results are either positive or Negative? Generally, the next step would be polysomnography in either case.

#### Polysomnography

Polysomnography is considered the gold standard for the diagnosis of sleep-related breathing disorders. Polysomnography typically involves the measurement of multiple channels of physiologic parameters including, but not limited to, electroencephalography (EEG), electrooculography (EOG), electromyography (EMG), electrocardiography (ECG), heart rate, respiratory effort, airflow, and oxygen saturation. Additional channels may include a snore-monitoring device and anterior tibialis electrodes. These latter electrodes are frequently placed to measure periodic limb movements that occur at night. The electrodes may also be important to ascertain whether changes that appear to be respiratory in nature may be related to body movements secondary to leg jerks. All of these parameters should be measured during an 8-hour attended study by a number of technologists sufficient to monitor their patients effectively as well provide safety for them<sup>3</sup>. This is generally a one-technologist to two-patient ratio. This may vary, however, with circumstances such as more difficult patients including those who are physically, cognitively, or emotionally challenged or pediatric patients.

#### Split-night Polysomnography

Polysomnography is referred to as a split-night study when the patient is monitored for half the night for evaluation and diagnosis of a sleep-related breathing disorder, and then in the second half of the night therapy is initiated. This therapy is typically nasal CPAP, but it may also extend to the use of mandibular repositioning devices. There are no conclusive data showing that split-night studies adversely affect a patient's compliance with treatment<sup>10</sup>. Split-night studies with nasal CPAP in the second half of the night are typically done only if the apnea is severe. This generally means an apnea/hypopnea index of at least 40 during a minimum of 2 hours of diagnostic

polysomnography, but different sleep disorders centers may set this figure at different levels. For a split night study to be acceptable, there needs to be at least 3 hours of nasal CPAP<sup>3</sup>.

#### Measures of Apnea Frequency

Various measures have been applied to describe the frequency of apneas and/or hypopneas. The apnea index is defined as the number of apnea episodes that occur per hour of sleep. This is also sometimes referred to as the respiratory disturbance index, and there is no difference in these indices. Sleep disordered breathing is now viewed as comprising apneas, hypopneas, and respiratory effort-related arousals. Using the American Academy of Sleep Medicine's recent position paper on hypopneas, the recommendation now is that even mild elevations of the apnea/hypopnea index be treated because of the increased risk of cardiovascular disease. Thus, any apnea/hypopnea index greater than or equal to 5 should be treated<sup>4</sup>.

#### Follow-up

After the data is scored by a technologist and thoroughly reviewed by a board-certified sleep specialist, a diagnosis is specified and a treatment plan formulated. The patient is then contacted or a follow up appointment is made, and the results of the polysomnogram are discussed between the sleep disorders specialist and the patient. The pertinent treatments are again reviewed and recommendations are made. Some patients will return for a nasal CPAP Titration or validation of the efficacy of an oral appliance. Others will seek a surgical solution, and overweight will be encouraged to lose weight. The specifics of various treatments are thoroughly discussed in the following articles.

#### References

1. American Thoracic Society. Indications and standards for the use of nasal continuous positive airway pressure (CPAP) in sleep apnea syndrome. *Am J Respir Med* 1994;150:1738-45.
2. Meoli AL, Casey KR, Clark RW, et al. Hypopnea in sleep-disordered breathing in adults. *Sleep* 2001;24(4):469-70.
3. Standards of Practice Committee of the American Sleep Disorders Association. Practice parameters for the indications for polysomnography and related procedures. *Sleep* 1997;20(6):406-22.
4. Guilleminault C, Stoohs R, Clerk A, et al. A cause of excessive daytime sleepiness. The upper airway resistance syndrome. *Chest* 1993;104(3):781-7.
5. Strohl KP, Redline S. Recognition of obstructive sleep apnea. *Am J Respir Crit Care Med* 1996;154:2798-9.
6. Winkelman JW, Goldman H, Piscatelli N, et al. Is thyroid function tests necessary in patients with suspected sleep apnea? *Sleep* 1996;19(10):790-3.
7. Davies RJ, Stradling JR. The relationship between neck circumferences, radiographic pharyngeal anatomy, and the obstructive sleep apnoea syndrome. *Eur Respir J* 1990;3(5):509-14.
8. Standards of Practice Committee of the American Sleep Disorders Association. Practice parameters for the use of portable recording in the assessment of obstructive sleep apnea. *Sleep* 1994;17(4):372-7.
9. Golpe R, Jimenez A, Carpizo R, Cifrian JM. Utility of home pulse oximeter as a screening test for patients with moderate to severe symptoms of obstructive sleep apnea. *Sleep* 1999;22(7):932-7.
10. Sanders MH, Constantine JP, Strollo PJ, et al. The impact of split-night polysomnography for diagnosis and positive pressure therapy titration on treatment acceptance and adherence in sleep apnea/hypopneas. *Sleep* 2000;23(1):17-24.