



THE DALLAS CENTER
FOR SLEEP DISORDERS
Sleep Better, Live Better • Adults & Pediatrics

Obstructive Sleep Apnea, Cardiovascular Consequences, and Treatment Options

*By Raj Kakar, M.D., M.P.H.
The Dallas Center for Sleep Disorders*

Obstructive Sleep Apnea affects approximately 20 million people in the U.S. alone, and millions more are affected worldwide. Over the last 10 years, significant research has been performed and now there is overwhelming evidence of the connection between Obstructive Sleep Apnea (OSA) and cardiovascular disease. Specifically, people affected by sleep apnea are at increased risk for hypertension (also known as high blood pressure), coronary artery disease (AKA atherosclerosis), heart attacks, strokes, cardiac arrhythmias, heart failure, diabetes, and even death. This scary list of adverse health outcomes demonstrates the significance of diagnosing sleep apnea in a timely manner, in order to initiate treatment. This last comment is actually the point --- fortunately, sleep apnea is a treatable condition. And you might be surprised that there are different options for treatment. With the right guidance from qualified experts, successful treatment is readily attainable.

First of all, we must dispel any myths, which prevent many people affected with sleep apnea from seeking the appropriate medical attention. The biggest myth is that only overweight or obese people get OSA. That is simply not true. In fact, many people who are considered to be at their ideal body weight, based on BMI (Body-Mass Index), are in fact diagnosed with OSA or Upper Airway Resistance Syndrome (UARS). UARS is a form of sleep-related breathing disorder in which a person has frequent arousals from sleep due to respiratory airway collapse or obstruction. Often, the events are not as obvious as seen in OSA, and in many cases, a person affected by UARS may not even snore. However, people with UARS may complain of unrefreshing sleep, frequent nocturnal awakenings, or excessive daytime sleepiness or fatigue. UARS, like OSA, is a treatable medical condition.

So how does one get sleep apnea? Well, most people who have sleep apnea are predisposed very early in life. It is actually the size and shape of the jaw and upper airway that determines whether a person will develop OSA. A narrow jaw and upper airway (i.e., oral cavity and throat) results in less space for air to flow during breathing. When a person sleeps, the soft tissues and muscles of the upper airway relax and collapse, leading to increased airflow resistance and airway obstruction. The airway obstruction is what causes OSA.

OSA is simply a repetitive, cyclical pattern in which a person stops breathing or nearly stops breathing for periods of longer than 10 seconds each time. The following is a description of what happens during an episode. As a person sleeps, the upper airway and jaw relax, resulting in collapse of the upper airway (i.e., the back of the throat). The lower jaw often relaxes and drops back a few millimeters when we sleep. Since the tongue base is attached to the lower jaw, the tongue will also drop back a few millimeters further during sleep. This combination of events leads to a very narrow passageway for air to flow through the back of the throat during sleep. Occasionally, the upper airway is

so collapsed that little or no air can pass. These episodes are called *apneas* (complete obstruction with no air movement) or *hypopneas* (partial obstruction with minimal air movement). When an apnea or hypopnea occurs, it lasts for a period of 10 seconds or more. In some cases, the episodes can last for over a minute! During this time, the blood oxygen saturation starts to drop, because no fresh air or oxygen is being delivered to the lungs. As the blood oxygen saturation drops, the body goes into a fight-or-flight response, resulting in increased heart rate and elevation of blood pressure. In essence, the heart is beating faster in an attempt to bring in more fresh blood and oxygen from the lungs. This sequence of events continues until, ultimately, a person has an arousal from sleep, resulting in a change in body position, a deep breath or gasp, or a brief awakening from sleep for 2-3 seconds (which most people don't recall). This cycle of events may then repeat itself several times per hour or even hundreds of times per night, depending on the severity of the case. These cyclical arousals not only disrupt and fragment one's sleep by resulting in a very shallow and unrefreshing sleep, but they also cause repetitive stress on the cardiovascular system with the elevations in heart rate and blood pressure. This repetitive stress causes the heart to work harder. Night after night, this chronic extra stress on the heart is what many scientists believe leads to the long-term adverse cardiovascular events (such as heart attacks, strokes and cardiac arrhythmias) and the impairment of blood pressure and blood sugar control.

Fortunately, as stated before, sleep apnea is a treatable condition. Further, effective treatment of OSA results in reductions in daytime blood pressure. Effective treatment not only reduces the risk of cardiac arrhythmias such as atrial fibrillation, but it can also reduce the risk of recurrent episodes of arrhythmias. The incidence of stroke and death is also significantly less in people treated for OSA. As compared to those who remain untreated for OSA, people who are treated have lower levels of blood glucose. Studies have highlighted how closely linked OSA and diabetes are. Therefore, people with OSA and diabetes who undergo treatment for OSA have much better control of their diabetes. Finally, treatment of OSA improves sleep quality and duration, associated with deeper and more refreshing sleep. This improvement in sleep carries on into the daytime, resulting in reduced daytime sleepiness and increased energy levels.

In fact, there is more than one form of treatment available. The American Academy of Sleep Medicine recognizes three forms of treatment that have been demonstrated to be effective for sleep apnea. The first of these options is known as CPAP, or Continuous Positive Airway Pressure. CPAP is still the gold standard of treatment for OSA, because it is a very safe and effective form of treatment. It is also generally successful for all degrees of OSA severity, including mild, moderate, severe, and very severe. CPAP is a device weighing less than 10 pounds that sits on your nightstand and filters the air in your room. Once it filters the room air, it blows it out at a higher, fixed pressure through a tube that connects to a mask. The mask, which can come in a multitude of varieties, either sits on your nose, under your nose, or over both your nose and mouth. The device is used during sleep to keep the upper airway stented open, using the higher, fixed air pressure delivered from the machine, through the tube, to your mask. It is not a ventilator, so it does not force you to breathe (although there are some models which do have this feature for very unique cases). However, it does make it *easier* to breathe, by keeping the upper airway open and preventing its collapse during sleep.

It does take time to get adjusted to using CPAP. Most people become adjusted to CPAP within 2-3 weeks. The real issue is getting used to sleeping with a mask on your nose, or under your nose. Once you get used to this new habit, then treatment with CPAP becomes easy. Generally, most people become comfortable using CPAP within one month, and at that point, they are able to sleep with CPAP for 4 or more hours per night. Research studies have shown that using CPAP for at least 4 hours per night results in associated health benefit. Therefore, it is important to sleep with CPAP for at least 4 hours per night, once the initial adjustment period is over. Further, the more time spent using CPAP during sleep, the more beneficial it is for your health. There are over 1 million people across the United States successfully using CPAP on a regular and continual basis, and if you ask one of them how well they sleep, they will likely tell you how CPAP has dramatically improved their sleep and changed their life for the better.

For people who do not succeed with CPAP or for those who prefer a different option, surgery can be an effective form of treatment. Generally, there is about a 50-70% chance of successful cure of sleep apnea with surgical intervention. This number takes into account all cases, including mild, moderate, severe, and very severe degrees. This statistic also accounts for the varied skills of surgeons who perform these types of procedures. In most cases, surgery usually improves the impairment in sleep-related breathing disorders, and generally, there is a reduction in the severity of OSA after surgery. It is important to discuss your individual situation with the ENT surgeon who will be performing the surgery. The risks and benefits of surgery should be examined prior to moving forward with surgery. Some risks associated with this type of surgery are bleeding, infection, and the risks commonly associated with general anesthesia. Further, it is vital to make certain that the ENT surgeon you choose has a breadth of experience in the type of procedure you plan to undergo. Not all ENT surgeons receive specialized training in sleep apnea surgery, so it is important to make sure that you find someone with extensive training and experience in this area for better results.

So what exactly do they do for surgery? Well, the most common surgical procedure for sleep apnea is called uvulopalatopharyngoplasty (UPPP). It basically means removing the uvula that hangs in the back of the throat, along with any excess tissue around the soft palate. At the same time, any residual adenoid or tonsil tissue will be resected, to increase the size of the airway to improve air flow. This type of surgery is quite painful due to the sensitive nerve fibers in that area, so recovery time is usually about 1 week after surgery. Your doctor will provide you with medications for pain during this time. You should then repeat a sleep study 2-3 months after surgery to reassess for any persistent, residual sleep apnea. If the UPPP is not completely successful, then a second phase of surgery may help to resolve the problem. The most common second phase of surgery is called genioglossal advancement (GA) with or without hyoid suspension. This surgery involves making a small window in the bone at the front of the lower jaw, to pull it forward a few millimeters. By fixing this part of the lower jaw forward, it also brings the tongue base forward a few millimeters, thus opening up space in the back of the throat. This procedure can be performed with or without a hyoid suspension, which is a surgery to done to bring the hyoid bone in the throat forward, thereby increasing the space in the upper airway.

Again, these surgical interventions can help to successfully treat OSA, especially in mild to moderate cases. For very severe cases, other more involved surgeries may be

the only way to a surgical cure. For individuals who are extremely obese with OSA, gastric bypass surgery or lap-band gastric surgery may be the only realistic surgical option. This type of surgery is considered a major surgery and careful planning and discussion with both your sleep disorders doctor and the surgeon is necessary.

A third option for treating sleep apnea is oral appliance therapy, also known as mandibular advancement splint. These oral appliances look very similar to retainers. They work by holding the lower jaw in a slightly forward position during sleep. This helps to increase the space for air flow in the upper airway, thereby reducing the frequency of respiratory events during sleep. It is important to be aware that oral appliances are only approved to treat snoring and cases of mild-to-moderate sleep apnea. They have not been shown to be successful in treating severe cases of OSA, due to the limitations on forward movement of the lower jaw.

The oral appliances are custom-made by dental labs. Generally, to get an oral appliance made for yourself, you will have to visit a dentist who is familiar with the use of these devices for the treatment of snoring or sleep apnea. You can talk to your sleep disorders doctor to find a dentist with this specialized training in your area.

Oral appliances can sometimes cause dental pain, TMJ pain, or jaw discomfort. These issues can usually be resolved with further adjustments of the device by your dentist. Often 2-3 regular follow-up visits with the dentist can help to prevent problems from developing. However, there are some cases in which an individual is unable to adjust to this form of treatment. Another issue with oral appliance therapy is that health insurance companies, historically, have not covered the cost for this type of treatment. Further, dental insurance has never provided coverage for oral appliance therapy. Nevertheless, with the growing medical evidence for oral appliance therapy, some health insurance companies are beginning to recognize this as a viable medical treatment alternative. Just as with surgery, a follow-up sleep study should be performed 2-3 months after starting treatment with an oral appliance, to ensure adequate treatment of snoring and sleep apnea.

Hopefully this review of obstructive sleep apnea, the significant cardiovascular consequences, and the treatment options will bring more awareness and understanding to this very important health issue. OSA is a treatable condition. Untreated sleep apnea is associated with an increased risk for hypertension (or high blood pressure), heart attacks, strokes, heart failure, cardiac arrhythmias, and diabetes. People with hypertension and untreated sleep apnea are more likely to have higher blood pressures. People with diabetes and untreated sleep apnea are more likely to have higher blood glucose levels. If you or someone you know may have sleep apnea, please consult a sleep disorders specialist with formal training in sleep medicine. The American Academy of Sleep Medicine (www.aasmnet.org/) and the American Board of Sleep Medicine (www.absm.org/) are helpful resources for finding a board-certified sleep disorders doctor near you.

Dr. Kakar is a Diplomate of the American Board of Sleep Medicine (D.ABSM) and he is board-certified in both Sleep Medicine and Internal Medicine. He is the medical director for the Dallas Center for Sleep Disorders in Plano, TX.