A Matter of Life and Breath

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Not to be overly dramatic, but your child may be slowing dying...and nobody knows it!

Obstructive sleep apnea (OSA) affects an estimated fifteen million adult Americans and is present in a large percentage of patients with high blood pressure and other heart ailments, such as coronary artery disease, stroke, atrial fibrillation, and heart failure.

Sleep-disordered breathing (SDB) is a general term for breathing difficulties during sleep and affects approximately 4 to 11 percent of children. SDB can range from frequent loud snoring to obstructive sleep apnea (OSA), a condition involving repeated episodes of partial or complete blockage of the airway during sleep. When a child’s breathing is interrupted while sleeping, the body experiences a reaction similar to choking. The heart rate slows, blood pressure rises, the brain is aroused, and sleep is disrupted. It’s not uncommon for oxygen levels in the blood to drop, as well. Approximately 10 percent of children snore, and about 2 to 4 percent of the pediatric population has obstructive sleep apnea.

Could My Child Have OSA?

The most obvious symptom of sleep-disordered breathing is loud snoring at night. Breathing can be interrupted by a partial or complete blockage of the airway, resulting in gasping and snorting noises and a subsequent awakening from sleep. Poor sleep quality is frequently observed and may result in irritability, daytime sleepiness, hyperactivity, bedwetting, and difficulty concentrating in school. In addition to heart and lung ailments, children with sleep-disordered breathing may also experience slow growth and development due to a decrease in growth hormone production. SDB may also cause the body to have an increased resistance to insulin or daytime fatigue with decreases in physical activity, which can lead to obesity.
Special Report: A Matter of Life and Breath

What Causes Sleep Apnea?

The most common cause of OSA is a small or narrow airway. The airway is basically formed by the throat, the soft palate, and the tongue. Changes in the size of the throat, and the position of the soft palate and tongue, can have a dramatic impact on the size of the airway. Obviously, the smaller the airway, the more difficult it is to breathe, especially during sleep, as the tongue tends to fall back into the airway as a person lies down and the muscles in the mouth and throat begin to relax.

Another often overlooked cause of airway obstruction is the size and position of the tongue. Narrow upper and lower jaws, or a recessed lower jaw, tend to force the tongue downward and backward, thereby constricting and possibly obstructing the airway. A frequent cause of upper jaw narrowness is mouth breathing. Well-developed airways allow normal breathing through the nose with the mouth closed. Research has shown that air breathed through the nose is vastly superior for normal development than air breathed through the mouth.

A significant benefit to nasal breathing is the formation of nitric oxide in the sinuses, which is secreted into the nasal passages and inhaled through the nose. Nitric oxide is known to prevent bacterial growth and improves the lungs ability to absorb oxygen.

During normal development, the bones of the face are shaped by a balance of muscular forces. Optimal breathing through the nose allows the tongue to be positioned up inside and to the front of the upper jaw. The tongue then exerts an expansive, outward, and forward pressure on the upper jaw and balances the constricting, or narrowing, pressure of the muscles of the cheeks and lips.

Enlarged tonsils and adenoids will tend to decrease the airway shape and size and are a frequent cause of SDB.
Primate studies have shown that obstructive nasal airways lead to open-mouth breathing. As the tongue assumes a lower position, the equilibrium of forces acting on the upper jaw is disrupted, and the muscles of the lips and cheeks exert an inward pressure on the teeth, creating a narrower, V-shaped upper jaw. The collapsed upper jaw, in turn, forces the tongue downward into the throat, thereby creating further airway obstruction. The narrower upper jaw creates not only overcrowding of the teeth but also a misalignment of the upper and lower jaws. Many times, this results in an overbite and an open bite, where the upper front teeth protrude ahead of the lower front teeth and fail to overlap vertically.

The most frequent causes of mouth breathing are enlarged tonsils and adenoids, nasal obstruction, and environmental allergies.

Whatever the cause, mouth breathing, unlike nasal breathing, allows unfiltered, cool air to irritate the tonsils and adenoids. In response, inflammation and swelling of the tonsils and adenoids occurs, resulting in further airway obstruction. It has been clearly demonstrated that obesity is a common cause of airway obstruction and sleep apnea in adults. However, research suggests that abnormal shape and position of the jaws is a much more important factor in determining who’s at risk for developing sleep-disordered breathing in six to eight-year-old children. Again, this is why an early evaluation by an “airway aware” and properly trained orthodontist is so critical.
How Is OSA Diagnosed?

As with any disease or condition, a thorough diagnosis, including a comprehensive health history, is important. Symptoms such as loud snoring, mouth breathing, or school performance problems should be reported to your pediatrician, who can then make the appropriate referral. Ordinarily, an ENT specialist will become involved. My preference is to also have an evaluation by a properly trained dentist, pediatric dentist, or orthodontist, as many of the oral conditions that may contribute to OSA may go unrecognized by the medical professional.

Wires are attached to the head and body to monitor brain waves, muscle tension, eye movement, breathing, and the level of oxygen in the blood. The test is usually administered in a sleep lab and is not painful but can occasionally produce inaccurate results, especially in children who may feel uncomfortable in a strange bed. Recently, an in-home sleep study has been developed in hopes of producing more accurate results in the confines of a more familiar place.

An orthodontic evaluation should also be performed to identify any skeletal imbalances or other conditions that could contribute to SDB. A lateral head x-ray has traditionally been used to assess the size of the airway and identify any possible narrowing or obstruction. With the advent of cone beam computed tomography (CBCT), a true three-dimensional analysis of the airway is now possible. Several sleep-disordered breathing questionnaires have proven to be quite accurate in determining who is suffering from SDB. When used in combination with a three-dimensional CBCT, the need for polysomnography has been eliminated in many cases.
Treatment for SDB

Enlarged tonsils and adenoids are the most common cause of SDB. A CONSERVATIVE APPROACH USING NASAL RINSES, DECONGESTANTS, AND STEROID SPRAYS is typically the first line of approach. If this regimen proves ineffective, surgical removal of the tonsils and adenoids (T&A) is generally considered. It may surprise you to learn that the majority of pediatric T&A procedures performed in the United States each year are done to treat sleep-disordered breathing and not for infections.

Another treatment protocol is the use of continuous positive airway pressure (CPAP), a mechanical device that applies mild air pressure in order to keep the airway open. CPAP is typically used by adults and sometimes in conjunction with T&A for severe OSA.

For those who cannot tolerate CPAP and are not a candidate for T&A, oral appliances can be made to force the lower jaw forward and temporarily open the airway. The appliance fits over the upper and lower teeth and is worn only at night while sleeping. The oral appliance is not without side effects; it can cause TMJ problems and shifting teeth, which may alter the bite. In adults where the jaws are no longer growing, surgical advancement and/or expansion of the upper and lower jaws may be necessary to open the airway.
Early Intervention Is a Must!

When it comes to orthodontics, the biggest mistake a parent or family dentist can make is to wait until all the permanent teeth are in before having an orthodontic evaluation for your child. By age seven, the majority of growth and development of the upper jaw is completed, and by age nine, the same holds true for the lower jaw. By age twelve, the majority of all facial growth is completed. Furthermore, if your child has an airway obstruction, the quality of their facial growth has been negatively impacted during most of their growth phase.

The longer one waits to intercede, the more severe the consequences and the more difficult the correction. Unfortunately, most orthodontists wait until the teenage years, when little facial growth remains, before attempting to correct what are, by now, longstanding problems. Sadly, the debate as to the effectiveness of early treatment continues in the orthodontic community while thousands of growing patients are harmed by what is referred to as “benign neglect,” or “let's wait and see what happens.”

What Can Be Done?

First and foremost, find an “airway-centric” orthodontist who recognizes the opportunity and the tremendous benefits that properly designed interceptive orthodontics can provide for growing patients. Previously in this book I described the benefits of upper and lower jaw expansion. In addition to creating a wider, more natural-looking smile and reducing the need for permanent tooth removal, palatal expansion creates more room for the tongue. As the palate widens, the tongue moves upward and forward to assume its proper position within the upper jaw. This forward movement of the tongue opens the airway. Since the floor of the nose is also the top of the upper jaw, the nasal cavity is also widened slightly, thereby decreasing nasal airway resistance and enhancing breathing.

A less common but likewise effective orthodontic treatment is the expansion of the lower dental arch. As the lower teeth are widened, the functional tongue space increases, further improving tongue posture and its positive influence on the airway.
There are some orthodontists who choose not to expand the jaws and instead have permanent teeth removed, which can further decrease the space for the tongue and actually constrict the airway. There are cases in which the dental crowding is so severe that permanent teeth need to be removed. In these cases, upper and lower arch expansion may be needed to mitigate the consequences of tooth removal.

Even the type of expander can have an impact on treatment. The bonded expander allows the jaw to rotate farther forward than a traditional expander, which may actually cause the lower jaw to rotate backward and possibly negate some of the benefits of expansion of the airway. **More and more orthodontists are now considering the impact of the treatment they provide on their patients’ airways.** Some practitioners will also prescribe functional appliances, such as the Herbst or the MARA, which dislocate the lower jaw forward to correct an overbite. In theory, this should improve the overbite, but in reality, these appliances, while popular, can create a false bite that can lead to TMJ problems.
In my opinion, **THE MOST POSITIVE IMPACT ON A PATIENT’S AIRWAY IS PROVIDED BY JAW EXPANSION** and the subsequent improvement in tongue posture. If a patient has an airway obstruction and sleep apnea due to a recessed chin, the optimal treatment is surgical advancement of the lower jaw to correct the overbite and restore facial balance by creating a stronger profile. As the lower jaw is moved forward the tongue, which is attached to the lower jaw, is moved forward as well, thereby opening the constricted airway.

As stated at the beginning of this report, I don’t want to be overly dramatic, but as you now know, undiagnosed and untreated airway obstruction can have a devastating and even possibly fatal impact on a person’s health. As many older adults can tell you, when it comes to the body, unlike a fine wine, things don’t usually improve with age. Many of our adult patients who require palatal expansion must have a surgical procedure to allow us to widen the jaws, which would have been unnecessary had we treated them when they were growing. Unfortunately, the majority of these patients did have braces as teenagers but did not have more comprehensive orthodontic treatment, including palatal expansion. Given the ease with which we can expand the jaws in growing patients, it only makes sense to have your child evaluated by age seven. This early assessment allows us to provide optimal orthodontic treatment at the most appropriate time.

I hope you found the information provided in this report educational and helpful. As both a father and an orthodontist, my life truly revolves around helping children (of my own, even though they are grown!) and patients. If you have further questions about whether early orthodontic treatment is right for your child or would like to schedule a consultation, our team welcomes you to call White Orthodontics!

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