

OBSTRUCTIVE SLEEP APNEA – IT’S NOT JUST ADULTS ANYMORE

Ok parents, listen up. What you are about to learn in the next several minutes can greatly improve the overall health of your children. Does your child have a short attention span, has signs of ADD or ADHD? Show signs of behavioral or emotional problems, or failure to thrive (low body weight, slow to develop)? These are some of the symptoms of children suffering from obstructive sleep apnea.

Let’s define a few terms you will read. Apnea is the cessation of air flow. Hypopnea is episodes of shallow breathing, and eupnea, which is normal unlabored breathing. Obstructive sleep apnea (OSA) affects many adults, but recent studies have shown that 1-3% of the pediatric population is affected also. Habitual snoring is seen in 3-12% of the general pediatric population. What you will learn in this article is how to differentiate between OSA and normal snoring and where to go from here.

Pediatric obstructive sleep apnea is defined as episodic upper airway obstruction during sleep. The obstruction may be partial or complete. The three major components of OSA are episodic hypoxia (lack of oxygen to tissue), intermittent hypercapnia (excessive carbon dioxide in the blood) and sleep fragmentation (interruption of any stage of sleep due to awakening). Those children that have OSA most often snore but not all habitual snoring children have OSA. Habitual snoring means there is aspiratory flow limitations that can also lead to sleep fragmentation and tachypnea (excessive, rapid breathing).

After the onset of sleep the airway muscle activity is reduced. As the muscles relax the airway can begin to collapse and the rate and depth of breathing changes. As the carbon dioxide level in the blood increases, neuromuscular activation occurs with the stimulation of the dilator muscles, which prevents the airway from collapsing. In OSA the complex interaction between airways predisposed to collapse and the neuromuscular compensation does not occur. There is no muscle activation (no dilation) and this leads to airway collapse. The child stops breathing until the carbon dioxide level builds up and forces the child to arouse enough to reestablish muscle tone to open the airway. This obstructive cycling interrupts REM sleep or will not allow the child to get into REM sleep. When the child reaches REM sleep the muscles relax even more which leads to more obstructions. So there are disproportionately more severe episodes of OSA during REM sleep. The importance of this OSA? There is a decrease in the secretion of growth hormone at night, when children suffer from OSA.

Diagnosis of OSA in children is difficult as their rate of respiration is faster as is their rate of oxygen desaturation. In children, if an episode occurs in two or more consecutive breaths it is labeled an apnea or hypopnea even if it lasts less than 10 seconds. Sleep studies use the AHI index (Apnea/Hypopnea) which is the number of OSA events per hour of sleep. Less than 1 is normal in children, 5-10 mild; 10-20 is moderate with greater than 20 severe. Some studies use the RDI index (Respiratory Disturbance) which in addition to OSA measures snoring arousals, hypoventilation episodes, and desaturation events.

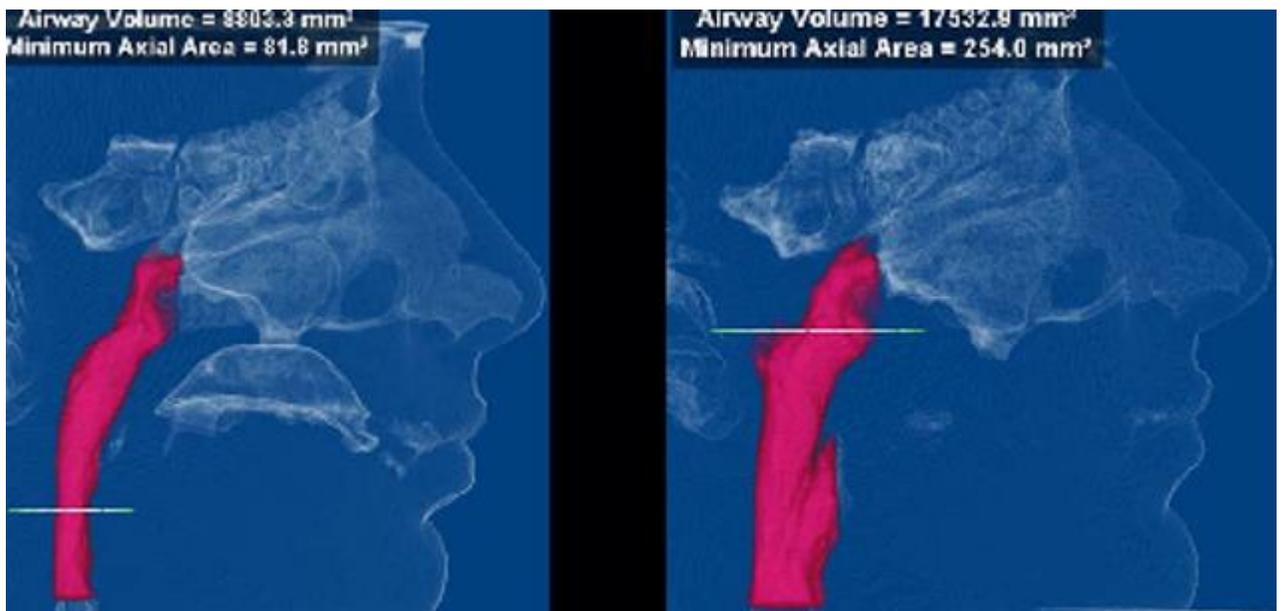
Signs observed in children with OSA include developmental delays, behavioral problems, hyperactivity (ADD, ADHD) failure to thrive (low or no weight gain) and in rare cases hypertension, pulmonary hypertension, and GERDS (gastroesophageal reflux disease). Parents will notice abnormal breathing during sleep, restlessness and frequent awakenings. Children will suffer from frequent nightmares, enuresis (bed wetting), and difficulty getting up in the morning as well as daytime sleepiness and mouth breathing. Clinically the EENT (Eye, Ear, Nose & Throat) doctor or the orthodontist will note abnormal facial relationships (skeletal) with long narrow faces. There will be a decrease in nasal patency (cannot get enough air volume through the nose) and a hypertrophy (enlargement) of the tonsils and adenoids.

Now we think we have diagnosed the problem where do we go from here? Visit the pediatrician and express your concerns. Write down notes to take about snoring, sleeping habits, and other symptoms. He will probably refer you to an EENT (Eye, Ear, Nose & Throat) physician for an exam. There are EENT's in Charlotte that specialize in treating children with OSA. The physician will do an exam to evaluate for large tonsils, adenoids, deviated septum, and length and thickness of soft palate. The doctor may refer your child for a Polysomnography (sleep study). The Polysomnography is the standard used to diagnose pediatric OSA. If a problem does exist the ENT may suggest an adenotonsillectomy procedure (removal of the adenoids and tonsils) to help open the airway. Next stop is the orthodontist to evaluate the skeletal structure to determine if the maxilla (upper jaw) is too narrow. Mouth breathers and children that snore tend to have narrow deep palates and dentally will present with a dental crossbite (top back teeth hit inside the bottom back teeth). This is measured by a posterior-anterior lateral cephalogram (x-ray). Research has provided orthodontists with millimeter measurements the maxilla should be for various ages. Studies have shown that by placing a rapid palate expander at an early age the airway by volume can increase from 30-75%. To determine if there is a narrow airway at the start he may refer your child for a CBCT scan (3-D x-ray). It should be stressed that to achieve maximum benefits of increased airway it must be a rapid palate expander cemented to the teeth and activated 2-4 times a day.

In summary, OSA affects only a small segment of the pediatric population but if it affects your child it is important to seek help. It affects males and females equally. Average age is 2-8 years old. Primary cause is large tonsils and adenoids. The main clinical sign is the child snores at night. Diagnosis of OSA is confirmed via a Polysomnography and the first line of treatment is an adenotonsillectomy. Second line of treatment is a rapid palatal expander. It is important to seek help at an early age. The younger the problem is corrected the more time for normal growth to reverse the effects of OSA.

Before Expander

After Expander



Pink area represents Airway Volume
Images provided by Dr. David Way