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Obstructive Sleep Apnea in Children With Abnormal Muscle Tone

by **John Garcia, M.D.**

Obstructive sleep apnea (OSA), the most common type of sleep apnea, affects about 12 million Americans. Although the majority of people with OSA are adults, the sleep disorder also affects children, particularly those who have disabilities associated with hyper- or hypotonia (abnormal muscle tone).

Children with cerebral palsy, spinal muscular atrophy, mitochondrial disorders and neuromuscular conditions (such as Duchenne muscular dystrophy) are more likely to develop OSA because of their inability to reposition themselves during apneic events. Children with craniofacial anomalies (including cleft lip and palate, craniosynostosis, Apert syndrome, Treacher Collins syndrome and Crouzon syndrome) also are at an increased risk for OSA. Such children typically have smaller airways, jaws and openings at the back of the throat.

Treating OSA can improve a child's quality of life and prevent other complications, such as growth delays.

Evaluating for OSA

Primary-care physicians and pediatricians who care for children with abnormal tone should consider evaluating such patients for OSA. The evaluation should include a medical history and a thorough physical examination. Evaluate the child's general appearance. Pay careful attention to craniofacial characteristics, such as midface hypoplasia, micrognathia, and occlusal relationships. Depending on the child's age, check for nasal obstruction.

If, after the exam, a physician suspects OSA, we recommend referring the patient to a sleep health specialist to confirm the diagnosis. Such a specialist will often validate the OSA diagnosis by performing a polysomnogram (PSG) test (see Page 2). This type of test is usually done in a specialized sleep clinic (see Page 3). Before referring a patient to a specialist, some physicians might want to review an audiotape or videotape of the child's sleeping patterns to further confirm their suspicions.

Types of Sleep Apnea

Obstructive Sleep Apnea (OSA)

The most common type of sleep apnea. OSA is caused by a breathing obstruction that stops the airflow in the nose and mouth.

Central Sleep Apnea (CSA)

A much less common type of sleep apnea. With CSA, the brain signal that instructs the body to breathe is delayed. Disease or injury involving the brain stem — such as a stroke, a brain tumor, a viral brain infection, or a chronic respiratory disease — can cause this central nervous system disorder.

Mixed Sleep Apnea

A combination of OSA and CSA.

Symptoms of OSA

The following symptoms might be present in children who have disabilities and are suspected of having OSA:

- Snoring
- Observed apnea
- Sleep fragmentation
- Excessive daytime sleepiness
- Neurocognitive abnormalities, including irritability, aggression and difficulty with attention
- Cor pulmonale (failure of the right side of the heart, caused by prolonged high blood pressure in the pulmonary artery and right ventricle)
- Failure to thrive (caused by persistent apnea and increased effort to breathe, which increases caloric requirements)
- Unexplained or persistent postsedation airway compromise, with or without oxygen desaturation (this might be caused by sedation for dental, surgical or radiologic procedures)
- Oxygen desaturation out of proportion to the primary disease (a child with cerebral palsy whose pneumonia appears well-controlled after several days in the hospital but who continues to have persistent nocturnal oxygen desaturation)
- Seizures (might be triggered by sleep fragmentation and subsequent sleep deprivation)

The presenting symptoms sometimes depend on the child's age. In children younger than age 5, snoring is the most common complaint. In addition, children 5 years and older commonly exhibit enuresis, behavior problems, deficient attention spans and failure to thrive.

Because the neurocognitive abnormalities associated with OSA can mimic the symptoms of a child who has attention deficit hyperactivity disorder, OSA is sometimes misdiagnosed. Physicians, therefore, might need to further investigate patients' symptoms. Any of the above symptoms might lead a primary-care physician or pediatrician to make a referral to a specialized sleep center, where the patient could undergo a PSG test to confirm the diagnosis of OSA.

PSG Testing

A PSG is usually done to diagnose OSA, narcolepsy and nocturnal seizures. It is a multiple-component test that electronically records specific physical activities while people sleep. The recordings become data that are analyzed by a sleep specialist to determine whether patients have a sleep disorder. There are four kinds of PSG studies:

- Diagnostic overnight PSG: This test provides general monitoring of sleep patterns (for example, the amount of nonREM and REM sleep, number of arousals, etc.) and a variety of body functions during sleep, including breathing patterns, heart rhythms and limb movements.

- Multiple sleep-latency test: This test is used to diagnose narcolepsy and to measure the degree of daytime sleepiness. It's usually performed on the morning following a diagnostic overnight PSG.
- Two-night evaluation PSG and continuous positive airway pressure (CPAP) titration: On the first night of the two-night study, the sleep specialist conducts general monitoring and a diagnostic evaluation. If the specialist discovers sleep apnea, the patient returns for a second night to determine the necessary CPAP pressure required to alleviate apnea. Note: A CPAP machine blows air into the nose through a nose mask, keeping the airway open and unobstructed.
- Split-night PSG with CPAP titration: Sleep specialists use this type of PSG when moderate or severe sleep apnea has been discovered or strongly suspected during the first part of the night's study. The second half of the night is used to determine the necessary CPAP pressure required to alleviate apnea.

Treatment

Treating OSA is critical and might involve surgery, CPAP therapy, medication or behavioral modification. Children who aren't treated for OSA can develop learning, developmental and/or behavior problems. In some cases, OSA can lead to growth delays, heart problems and high blood pressure. In addition, OSA might cause daytime sleepiness that results in personality changes, lost productivity in school, and interpersonal problems.

Adenotonsillectomy

Adenotonsillectomy, a routine procedure, can improve OSA. Physicians should consider using this procedure as a first treatment option for children when there's evidence of adenotonsillar hypertrophy.

CPAP

When adenotonsillectomy is contraindicated or has failed, some children benefit from treatment with CPAP. CPAP isn't a ventilator; it acts to keep the airway open so patients can breathe easily. A sleep medicine specialist will prescribe the pressure; a home health-care company can set up the machine and provide training in its use and maintenance. Because children grow rapidly, frequent follow-up visits are necessary, and the mask needs adjusting at least every six months.

Medications

Researchers and medical providers have studied several medications for OSA. In people with nasal airway obstruction that causes OSA, nasal steroid sprays are effective.

Behavioral Modification

With some children who have OSA, we use behavioral modification techniques to desensitize children to the CPAP mask. This involves gradually increasing the time children wear a mask at night.

Author's PROFILE

John Garcia, M.D., a board-certified sleep specialist, works with Gillette patients who have disabilities and associated sleep disorders. Such disorders include obstructive sleep apnea, sleepwalking, circadian rhythm disorders, and restless legs syndrome. He uses a combination of behavior management, medications, surgery and other therapies in his practice.



Garcia is a graduate of the University of Iowa School of Medicine. He completed a pediatric residency and a fellowship in behavioral/developmental pediatrics at Riley Hospital for Children in Indianapolis, Ind. He completed a sleep training program at the Minnesota Regional Sleep Disorders Center in Minneapolis.

Garcia holds clinics at our main campus in St. Paul and at our Burnsville Clinic.

New Sleep Health Clinic to Open in Spring 2007

Gillette's new Sleep Health Clinic will accommodate the needs of patients who have physical disabilities. The clinic will include two sound- and light-proof rooms for patients undergoing overnight studies. XLTEK monitoring equipment, which combines sleep and electroencephalogram monitoring, will be available.

Families of patients undergoing sleep studies may stay overnight at Gillette, near the patient's room. The sleep clinic also will conduct daytime multiple sleep-latency tests. John Garcia, M.D., a board-certified sleep specialist, will work with a polysomnography technologist and other staff to operate the clinic.

For more information about the Sleep Health Clinic, contact JoAnn Pesek at 651-726-2852.

New Gillette Location

The Gillette Lifetime Specialty Healthcare adult clinic moved to a new location — 435 Phalen Boulevard in St. Paul — in February. The new clinic significantly expands our clinical space and allows us to offer more services. The new space includes:

- 14 exam rooms
- Two radiology suites
- Six seating and orthotics fitting rooms (including two spaces for molding/casting)
- Expanded physical, occupational and speech therapy spaces
- A rehabilitation gym
- Multipurpose rooms and areas for training, evaluations and meetings
- A Family Resource Center
- A Child and Family Services area

The clinic also offers computer assessments; augmentative- and alternative-communication assessments and training; powered-mobility assessments and training; and seating and wheelchair evaluations.

A community open house will take place on Thursday, March 8, from 4:30 to 7:30 p.m. Please call 651-312-3114 to reserve a spot.

For directions, visit the Gillette Children's Specialty Healthcare Web site at www.gillettechildrens.org.

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Please send your questions or comments to:

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Referral Information

Gillette accepts referrals from physicians, community professionals and outside agencies. To schedule an outpatient appointment, contact New Patient Services at 651-290-8707, Monday through Friday between 8 a.m. and 5:30 p.m. Physicians who are on staff can admit patients by calling 651-229-3890.

New Patient Services	651-290-8707
Center for Cerebral Palsy	651-290-8712
Center for Craniofacial Services	651-325-2308
Center for Pediatric Neurosciences	651-312-3176
Center for Pediatric Orthopaedics	651-229-1758
Center for Pediatric Rehabilitation	651-229-3915
Center for Pediatric Rheumatology	651-229-3893
Center for Spina Bifida	651-229-3878
Gillette Lifetime Specialty Healthcare	651-634-1920

Upcoming Conference

10th Annual *Cause for Concern?* Conference

Head to Toe — Differential Diagnosis in the Pediatric Clinic

Friday, May 4, 2007
7:30 a.m. to 6 p.m.

Minnesota History Center
345 Kellogg Blvd. W.
St. Paul, Minn.
651-296-6126

This course offers assessment tools to help primary-care providers determine whether there is “cause for concern” when children and teens have symptoms that could reflect serious underlying conditions. The course also helps providers determine appropriate evaluation and intervention strategies.

For more information, visit the Gillette Web site at www.gillettechildrens.org. Or call Susan Ellerbusch Toavs, program manager for Gillette's Center for Pediatric Rehabilitation, at 651-290-8707 or 800-719-4040 (toll-free).

Online CME Available

A Pediatric Perspective and additional case studies are available for continuing medical education (CME) credit online. To access our online CME, visit www.gillettechildrens.org.

If you're interested in obtaining back issues of *A Pediatric Perspective*, log on to our Web site at <http://www.gillettechildrens.org/default.cfm/PID=1.7.8.1>. Issues from 1998 to the present are available.