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BOARD REVIEW CORNER

The Child's Rumbling Slumber

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A 4-year-old Caucasian male presents to a sleep disorders clinic for evaluation. The child has recently started preschool, and the parents report that he has significant difficulty with daytime activities, such as following directions and completing assigned tasks. In addition, he has begun to snore almost nightly in the last 6 months. His mother notes that he sweats profusely while sleeping and his sleep is described as restless ("flops all over" the bed and sleeps in odd body positions). He goes to bed at 8 pm and rises at 7 am. The bedtime ritual is fairly easy, and he does not commonly resist sleep.

His daytime activity is characterized as "more active than other children." He still takes one afternoon nap of approximately 2 hours. Despite the nap he also commonly falls asleep on the 30-minute ride home from daycare.

The birth history is unremarkable: born at 40 weeks, without complications, and normal early growth and development. He takes occasional antihistamines for cough and rhinitis.

The patient has no siblings. His father has obstructive sleep apnea. There are no family members with other cardiovascular, respiratory, or neurologic disease. He is not exposed to passive smoke. He lives with both parents and tends to sleep in his own bed.

A review of systems is positive for intermittent upper airway allergy symptoms. The remainder of the review of systems is unremarkable. He does have occasional episodes of bed wetting, but these are decreasing over time.

On examination the child is active but follows direction. Height and weight are at the 25th percentile for age. Vital signs are normal for age. Nares demonstrate modest nasal edema. The oropharyngeal exam demonstrates a Mallampati class II oropharynx, with tonsils graded at 3+. The palate and jaw are normal in size and dimension. The tongue is normal in size and position. The remainder of the examination is unremarkable.

QUESTION:
Which of the following would be most helpful in the evaluation of OSA in this 4-year-old?

a. Nighttime home sleep study
b. Daytime (nap) in-lab PSG
c. Nighttime in-lab PSG
d. Nighttime home video recording of child sleeping
e. No test is needed. History is adequate to diagnose disorder

ANSWER: c. Nighttime in-lab PSG

Obstructive sleep apnea occurs in approximately 2% of young children with a peak prevalence at about age 5,[1] while habitual snoring occurs in 8% to 12%. The clinical consequences of childhood obstructive sleep apnea have been recently reviewed and include behavior problems, academic performance deficits, growth limitations, and cardiovascular consequences.[2]

Differentiating OSA from habitual snoring can be difficult based on clinical history. Overnight polysomnography provides the most information on extent of cardiorespiratory events and is currently the gold standard for evaluation of pediatric obstructive sleep apnea. In-lab polysomnography allows for the characterization of sleep architecture and assures adequate evaluation of sleep stages, including REM sleep. Currently, both the American Academy of Pediatrics and American Thoracic Society recommend overnight polysomnography for evaluation of children with signs and symptoms of OSA.[3,4]

Potential limitations to overnight in-lab studies include night-to-night variability, first night effect with disrupted sleep architecture, and patient/family apprehension about the study. Older children do demonstrate some difference in sleep architecture when studied on consecutive nights; however, respiratory differences are not clinically significant.[5,6]

Nighttime home sleep studies are quite varied in scope of and content. The American Academy of Pediatrics listed home sleep studies as an option for diagnostic testing.[3] While there have been some studies showing reasonable positive predictive value,[7] many insurance companies consider home studies investigational and do not reimburse for these. Furthermore, children tend to pull off leads, making data difficult to interpret. Home testing based on oximetry alone is not adequate for identification of OSA in otherwise healthy children.[8] The American Academy of Sleep Medicine's clinical guidelines on portable monitoring specifically exclude children due to paucity of data.[9]

Nap studies are inadequate since REM sleep is limited or may not be achieved during sleep, thus underestimating the degree and severity of respiratory events.[10,11]

Nighttime home video recording is listed as an option for evaluation of certain children in the AAP consensus statement.[3] In a trial of 58 children comparing PSG and home video recordings, the sensitivity of overall investigator judgment was 94% with a specificity of 68%, with the authors suggesting a possible role in screening for those needing formal PSG.[12] This method of evaluation is not, however, reimbursed by most insurance companies and is not commonly used as an isolated testing method.

Clinical history has been shown to be inadequate for diagnosis of OSA in children. A systematic review of the literature found very little correlation between clinical exam and PSG-proven OSA.[13] Common nighttime symptoms include snoring; labored breathing with gasping, gagging, or choking; noisy breathing; witnessed apnea; and sleeping with open mouth and hyperextended neck. Sweating during sleep is also a commonly noted symptom but has very little correlation with OSA.

Norms for polysomnography in children have been established by 4 studies.[14-17] These studies demonstrated that normal children have central and obstructive apnea indices of one or fewer per hour. Defining the lower limit of clinically meaningful sleep apnea, however, remains the subject of some debate, and most clinicians would favor more liberal standards than an apnea hypopnea index of 5/h as the lower limit of disease. One clinical severity index defines mild OSA as an AHI ≥ 1-5 without significant desaturations, moderate OSA as AHI ≥ 5-10 without significant desaturation, and severe OSA as AHI ≥ 10 or significant, sustained desaturations below 92%. The significance of such severity scoring as it relates to treatment options or long-term sequelae is uncertain.

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DISCLOSURE STATEMENT

The authors have indicated no financial conflicts of interest.