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NEWS

RSNA Press Release

Advanced MR Imaging Helps in Diagnosis, Treatment of Obstructive Sleep Apnea in Children

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OAK BROOK, Ill. - MR (magnetic resonance) imaging is an effective tool in helping physicians diagnose and treat causes of obstructive sleep apnea (OSA) in children - providing key information about upper respiratory tract anatomy and patterns of airway motion during sleep, according to a new study appearing in the April issue of the journal *Radiology*.

The study from Cincinnati Children's Hospital Medical Center (CCHMC) compared, for the first time, airway motion in children with OSA and those without the sleep disorder. With cine MR imaging, the radiologist takes a series of pictures during a real-time cycle. The images are played back - creating a movie - to show the patient's airway movement.

"The information provided by the MR scan can help direct the physician to the cause of the problem - which may be treated surgically or non-surgically," said the study's lead author Lane F. Donnelly, M.D., radiologist in chief at CCHMC and professor of radiology at University of Cincinnati College of Medicine.

According to the American Academy of Pediatrics, approximately 2 percent of children in the United States suffer from OSA, which causes an individual to stop breathing for short periods of time during sleep. The condition is brought on by an obstruction in the mouth, throat or nose, such as enlarged adenoids or tonsils. With OSA, structures in the throat collapse continually during sleep and block air motion. After 10 seconds or longer - the airway reopens and breathing starts again. OSA can adversely affect a person's sleep cycle. Children with OSA may experience snoring, excessive daytime sleepiness, attention deficit disorder (ADD) and learning disabilities.

Children who have had their tonsils and adenoids removed yet continue to have symptoms have problematic OSA. Children with Down syndrome and cerebral palsy are also prone to OSA.

"Advanced MR imaging should become a standard tool for the evaluation of children with problematic sleep apnea because it can help us further understand the dynamics of airway motion during sleep," Dr. Donnelly said.

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For the study, researchers performed cine MR imaging on 32 children, ranging from six months to 19 years old. The study included 16 children with documented OSA and 16 age-matched children who had no history or signs of airway disease. Thirty of the children were sedated for the MR procedure. The two remaining patients fell asleep spontaneously.

The patterns of airway motion were evaluated in three locations - the nasopharynx, oropharynx and hypopharynx, or the back of the nose, mouth and throat.

"In the children without OSA, the base of the tongue, nasal area and walls of the throat were still during sleep," Dr. Donnelly said. "For those with a level of obstruction, there was a statistically significant difference in the pattern of movement."

Dr. Donnelly explained that the children with OSA were much more apt to have an intermittent collapse - or higher degree of motion - within the nasal and throat areas than the patients in the control group.

None of the control patients demonstrated a collapse of the hypopharynx, but 13 of the 16 patients with OSA had a collapsed airway in this area. The mean size of the adenoid tonsils (which differ from the tonsils at the back of the throat) was also statistically larger in patients with OSA than in those without the disorder. The change in diameter of the airway was greater in patients with OSA than the control group - suggesting that small degrees of motion should be considered normal, but larger degrees of motion are abnormal.

Radiographs (x-rays) of the skull and airway are commonly used to help diagnose OSA. A sleep test, polysomnography, can also determine if OSA is present; however, unlike cine MR imaging, it cannot provide detailed anatomical information as to why OSA occurs.

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"Upper Airway Motion Depicted at Cine MR Imaging Performed During Sleep: Comparison Between Young Patients With and Those Without Obstructive Sleep Apnea." Collaborating with Dr. Donnelly on this study were Victoria Surdulescu, M.D., Barbara A. Chini, M.D., Keith A. Casper, M.S., Stacy A. Poe, M.S., and Raouf S. Amin, M.D.

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