Gillette Children's Specialty Healthcare

A PEDIATRIC Perspective

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Sleep Terrors or Nocturnal Frontal Lobe Epilepsy?

by John Garcia, M.D., and Nicole Williams, M.D.

Introduction

Differentiating sleep terrors from nocturnal seizures can be challenging. In both instances, patients seem to awaken suddenly from non-REM sleep; they may scream, appear agitated, and move their arms and legs. However, there are important differences to look for when making a diagnosis.

Sleep Terrors

Description

Sleep terrors (also called "night terrors") are one example of a disorder of arousal, a common type of parasomnia. Other examples include everything from calm sleepwalking to emotionally agitated or complex behaviors such as dressing or eating while asleep. Up to 17 percent of preschool-aged children experience disorders of arousal.[1]

As its name suggests, during a disorder of arousal the person is only partially awake. Classic sleep terrors occur in the first half of the night, usually in the first 60 to 90 minutes of sleep, and the child arouses suddenly out of deep non-REM sleep. Typically, the child has no memory of the sleep terror episode.

Children experiencing sleep terrors may display some or all of these symptoms: disorientation; emotional outbursts, such as screaming and the appearance of fear; motor activity, such as flailing or running in sleep; and profound autonomic discharges, such as flushing, sweating and tachycardia. Because of the intensity of activity during sleep terrors, patients can unintentionally hurt themselves or others during an episode. The duration of the episodes varies, and each episode usually ends abruptly, with the child returning to a deep sleep. Typically, sleep terrors decrease in frequency and dramatic quality as the child gets older, and children usually outgrow them by the time they reach school age.[2]

Diagnosis

Clinical evaluation is sufficient; polysomnograms and video electroencephalograms (EEGs) are typically not required. When evaluating a child for sleep terrors, it is important to ask if the episodes occur shortly after the onset of sleep or later in the night. Another consideration is the age of the child, because sleep terrors usually affect young children and would not be as common in a school-aged child. Additionally, ask parents if the child has a history of daytime staring spells or seizures, unusual posturing, limb jerking, or a change in skin color during the episodes. If the parents observe any such daytime symptoms, or if the child has a neurodevelopmental disability, consider a video EEG to establish or rule out seizures.

Treatment Options

Reassure parents that sleep terrors are common and that most children outgrow them by the time they are school-age. Recommend that parents intervene as gently as possible. For example, parents should not try to wake up the child. Instead, they should simply guide the child back to bed and help settle him or her. If the child sleepwalks, recommend safety precautions such as securing windows, putting a gate at the top of stairs, and adding a motion detector alarm in the child's bedroom doorway to alert parents that the child is sleepwalking. If the sleep terrors are particularly dramatic and nocturnal seizures have been ruled out, consider prescribing a low dose of clonazepam at bedtime.

Nocturnal Frontal Lobe Epilepsy

Description

Nocturnal Frontal Lobe Epilepsy (NFLE) is characterized by frontal lobe seizures that occur primarily during sleep and may mimic disorders of arousal in which the patient's behavior is agitated. Both sporadic and familial forms of NFLE exist. Although the syndrome's typical onset occurs between 7 and 12 years, NFLE has been documented in patients from infancy to adulthood.

During a NFLE seizure, patients often exhibit behaviors that resemble sleep terrors:

- Sudden, explosive arousal from non-REM sleep, often within 30 minutes of falling asleep
- Vocalizations, including screaming or laughing
- Arm and leg movements, such as fencer posturing (one arm extended while the other flexes); kicking or bicycle-pedaling motions of legs; rocking; pelvic thrusting; or tonic stiffening of the limbs
- Returning to sleep immediately after the seizure

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To further confuse matters, most patients who have NFLE have normal CT scans and MRIs. Additionally, EEGs of patients experiencing NFLE are often inconclusive and uninformative, because a large portion of the frontal lobe cortex is undetected by routine scalp electrodes, and frequent muscle artifacts during motor seizures can obscure the EEG recording. EEGs recorded during the ictal period might not capture seizure activity for as many as 44 percent of patients.[3]

Given the similarities in symptoms, it would be possible to mistake NFLE for sleep terrors. Children with both disorders suffer from chronically disrupted sleep, and parasomnias and epilepsy may occur in the same individual. However, several characteristics typically associated with NFLE are not seen with sleep terrors.

Diagnosis

During clinical evaluation, several factors point to NFLE rather than sleep terrors:

- Child is school-age rather than preschool-age.
- Seizures are brief, lasting seconds to less than two minutes, and frequently occur up to 20 times per night instead of one to two times per night.
- Episodes typically include stereotypic movement.
- Some patients experience a nonspecific aura of somatosensory, sensory, psychic or autonomic symptoms.
- Patient may recall episodes.
- Patient has a history of daytime sleepiness, daytime seizures, or neurodevelopmental disabilities or has a family history of epilepsy.

When some of these factors are present, using the Frontal Lobe Epilepsy (FLEP) scale[4] can be helpful (see box at right). For typical parasomnias such as sleep terrors, the FLEP score will be less than zero. For NFLE, the score will be greater than zero.

If the patient history or FLEP score indicates potential NFLE, an overnight video EEG is required to establish the diagnosis.

Treatment Options

Antiseizure medications, including carbamazepine, oxcarbazepine, lamotrigine, topiramate, and levetiracetam, are used to treat NFLE. A third to a half of patients continue to have seizures despite medical treatment. In refractory patients, epilepsy surgery or a vagus nerve stimulator may be considered.

Conclusion

Sleep terrors and NFLE seizures have some similarities. With closer clinical evaluation and proper diagnostic testing, however, the two conditions can be distinguished. The sleep health medicine specialists and pediatric neurologists at Gillette Children's Specialty Healthcare's Center for Pediatric Neurosciences can be a resource for suspected cases of NFLE or sleep terrors.

Frontal Lobe Epilepsy Scale (FLEP)

Characteristic		Score
Age of onset	> 55 years	−1
Duration	< 2 minutes	+1
	2-10 minutes	0
	> 10 minutes	−2
Number of events in a night	1-2	0
	3-5	+1
	> 5	+2
Time of night	30 minutes of sleep onset	+1
	Aura associated?	+2
	Wander outside bedroom?	−2
	Complex behaviors? Pick up objects? Dress?	−2
	Dystonic posturing, tonic limb extension?	+1
Stereotypic movement	Highly	+1
	Uncertain	0
	Variable	−1
Recall?	Yes	+1
	No	0
Vocalization	Coherent speech with incomplete or no recall	−2
	Coherent speech with recall	+2

Scores < 0 = Likely to be sleep terrors
Scores > 0 = Likely to be NFLE

Sleep Terrors vs. Nocturnal Frontal Lobe Epilepsy

Parameter	Sleep Terrors	NFLE
Typical age of onset	Preschool	7-12 years
Number of episodes/night	1-2	1-20 or more
Behaviors	Moving arms and legs	Moving arms and legs, stereotypic movement
	Possibly walking around	Walking around is, rare
	Possibly vocalizing or screaming	Vocalizing, screaming, laughing
	No recall of episode	Recall is more likely
	No aura	May have an aura
Prognosis	Often resolves by school age	Usually persists into adulthood

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A Pediatric Perspective focuses on specialized topics in pediatrics, orthopedics, neurology and rehabilitation medicine.

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Gillette Welcomes New Sleep Health Specialist Laurel Wills, M.D.

Laurel Wills, M.D.

Laurel Wills, M.D., is a specialist in pediatric and adolescent sleep medicine, with a particular focus on caring for children and youth who have developmental disabilities.

After receiving her medical degree from Boston University School of Medicine, Wills completed her pediatrics residency at the University of Chicago Medical Center and La Rabida Children's Hospital in Chicago. She went on to finish her fellowship in developmental and behavioral pediatrics, including training in pediatric sleep medicine, at Children's Hospital in Boston. Wills is board-certified in general pediatrics, developmental-behavioral pediatrics, and sleep medicine. Her professional memberships include the American Academy of Pediatrics and the American Academy of Sleep Medicine.

Case Study – Sleep Terrors

History

The parents of a 3½-year-old boy brought their son to Gillette's Sleep Health Clinic for an evaluation of his sleep difficulties. They described a history of nearly nightly episodes in which their son would seem to wake up screaming within 60 to 90 minutes of falling asleep. When they entered his room, they would find him sitting upright in bed with his eyes open, yet he would not recognize his parents. He often would be sweating, breathing fast and looking panicked. The episodes usually lasted less than 15 minutes and ended as abruptly as they began. The following day, the patient would have no memory of the episode. The family learned that if they did not try to wake their child or console him, the episodes were shorter. The patient's parents said they became so accustomed to the episodes that they could "set their watch" by them. Because of the frequency of the episodes, the parents learned to delay their own bedtime so they could resettle their son first.

Evaluation

When questioned further, the parents said the patient's bedtime ranged from 8:30 to 10:30 p.m., which indicated he was somewhat sleep-deprived. After observing the parents' interaction with the patient, it was evident that he was well-adjusted, and the sleep disruptions were not related to emotional trauma.

Treatment

His history and symptoms represent a classic case of sleep terrors, so education and reassurance seemed the best course of action. The parents were reassured that their son was not having seizures and that parasomnias do not signal emotional distress. Additionally, they were instructed to establish an earlier and more regular bedtime to decrease their son's sleep deprivation and help prevent episodes. As a result of those steps, the frequency of the night terrors went from nearly nightly to a very tolerable once or twice a week. No medication was required. One year later, their son experienced a 14-night stretch of sleep terrors when school started because he was not getting enough sleep. Re-establishing rigorous sleep hygiene was sufficient to reduce the number of episodes.

Case Study – NFLE

History

After an 11-year-old boy experienced a first generalized convulsive seizure, his parents brought him to see a Gillette neurologist for evaluation. The seizure occurred at school and lasted five to 10 seconds. A routine EEG performed prior to the visit was normal.

Evaluation

When questioned further, the patient's parents reported that a few times per month, the boy also had episodes during sleep – raising suspicions that he might have NFLE. They characterized the episodes as follows: the boy would wake up one to two hours after falling asleep, sit up, scream and then speak. Afterward, he would fall back asleep, and he had no memory of the episodes in the morning.

To help pinpoint a diagnosis, the patient had an overnight video EEG that captured several potential seizures during sleep. The events were highly stereotyped: the patient started to adjust his position in bed, and then made kicking movements, sat up and let out a scream. He fell back to sleep immediately afterward. The clinical events were consistent with frontal lobe seizures, and the patient's video EEG showed bursts of frontal epileptiform discharges during the episodes – confirming NFLE.

Treatment

Oxcarbazepine was started. At a two-month follow-up appointment, the patient's parents reported that he had had no further daytime seizures. However, his nocturnal seizures remained, although they had decreased somewhat in frequency. The dose of oxcarbazepine was increased with no further improvement in nocturnal seizure control. Therefore, lamotrigine was added and his nocturnal seizures disappeared.

Author PROFILES

John Garcia, M.D.
Sleep Medicine Specialist

John Garcia, M.D.

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

Garcia is a graduate of the University of Iowa School of Medicine. He completed a residency in pediatrics and one year of fellowship training in behavioral/developmental pediatrics at Riley Hospital for Children in Indianapolis. He then completed a sleep fellowship equivalent at the Minnesota Regional Sleep Disorders Center in Minneapolis. His professional associations include the American Board of Sleep Medicine and the American Board of Pediatrics.

Nicole Williams, M.D.
Pediatric Neurologist

Nicole Williams, M.D.

Nicole Williams, M.D., is a board-certified general pediatric neurologist who specializes in the care of children who have epilepsy, cerebral palsy, and developmental delays, particularly neurologic conditions that appear during the infant and toddler years.

Williams graduated from the University of Minnesota Medical School and completed a pediatric residency and a child neurology residency at Stanford University/Lucile Packard Children's Hospital in Palo Alto, Calif. In addition, she completed elective clinical rotations in neonatal neurology at the University of California, San Francisco School of Medicine and pediatrics at LAMB Hospital in Bangladesh. Her studies also included a course in designing clinical research at the University of California, San Francisco School of Medicine.

Gillette's Sleep Health Clinic

Gillette's Sleep Health Clinic is part of our Center for Pediatric Neurosciences, which offers interdisciplinary services and advanced neurodiagnostic capabilities for patients with neurologic conditions. In keeping with our pediatric focus, Gillette's Sleep Health Clinic is dedicated to meeting the needs of children, teens and young adults who have disabilities. We also care for typically developing children who have sleep disorders. The Sleep Health Clinic is accredited by the American Academy of Sleep Medicine.

Visit www.gillettechildrens.org/SleepMedicineVideo to view a video about the Sleep Health Clinic.

Resources

[1] Ohayon M, Guilleminault C, Priest R. *Night terrors, sleepwalking and confusional arousals in the general population: Their frequency and relationship to other sleep and mental disorders*. J Clin Psychiatry 1999; 60 (4):268-76.

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[3] Provini F, Plazzi G, Tinuper P, Vandi S, Lugaresi E, and Montagna P. *Nocturnal frontal lobe epilepsy: A clinical and polygraphic overview of 100 consecutive cases.* Brain (1999), 122, 1017–1031.

[4] Derry CP, Davey M, Johns M, Kron K, Glencross D, Marini C, Scheffer IE, Berkovic SF. *Distinguishing sleep disorders from seizures: diagnosing bumps in the night.* Arch Neurol 2006; 63(5):705-9.