

SLEEP & EPILEPSY: COMMON BEDFELLOWS

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The interaction between sleep and epilepsy has been well known since the times of Aristotle. Fragmented sleep causes daytime fatigue and poor seizure control, while uncontrolled seizures and epilepsy can worsen sleep quality. Moreover, both sleep disruption and epilepsy negatively affect overall quality of life (QOL).

Non-rapid eye movement sleep, via synchronization of neuronal circuits, activates interictal epileptiform discharges (IEDs) and seizures; both occur predominantly in N1 and N2 sleep in children. However, in desynchronized rapid eye movement (REM) sleep, seizures and IEDs are very uncommon. Additionally, seizure occurrence is nonrandom, dependent on underlying circadian rhythms. Temporal lobe seizures (TLS) occur during wakefulness, while frontal lobe seizures (FLS) occur in sleep. Sleep-wake state rather than day-night timing is a better predictor of these seizures. Conversely, seizures and epilepsy also influence sleep. Patients with epilepsy have abnormal sleep architecture, including reduced N2 and N3 sleep and increased N1 sleep and REM latency.

The precise knowledge on the prevalence of sleep disorders in the epilepsy population will help us to appropriately diagnose, treat and channel funds into research on the subject. To achieve this, patients should be screened for sleep disorders using questionnaires. Currently, existing sleep questionnaires include the Pediatric Sleep Questionnaire (PSQ), Child Sleep Habits Questionnaire (CSHQ), Cleveland Adolescents Sleep Questionnaire (CASQ) and the Pediatric Daytime Sleepiness Scale (PDSS). Using the PSQ, 45% of children with refractory epilepsy were identified as being at risk of OSA. These children can then be referred to the sleep clinic for further evaluation, and if necessary, polysomnography to confirm the diagnosis. In one study, 70% of such children referred for a sleep study were found to have OSA, which improved which not only improved with adenotonsillectomy, but also improved seizure frequency and intensity. In addition, VNS has been shown to precipitate OSA, CSA and hypoventilation. Hence screening for sleep problems before inserting is very important.

AEDs can be selected based on their side effect profile. Medications such as barbiturates and benzodiazepines can be used to improve insomnia, while lamotrigine, felbamate and ethosuximide can be used to counteract daytime drowsiness, and can be given earlier in the evening rather than at bedtime so as to not worsen insomnia. Tiagabine and gabapentin can be used to consolidate sleep. Additionally, the circadian pattern of seizure occurrence can guide the timing of higher dosing of AEDs around seizure peaks. For example, in patients with nocturnal frontal lobe epilepsy or juvenile myoclonic epilepsy, higher evening doses and small morning doses can achieve better seizure control and also improve daytime alertness.

More than 80% of pre-school age children experience parasomnias, which are a big source of confusion in differentiating them from nocturnal seizures, especially frontal lobe epilepsy. In addition, 30-40% of patients with nocturnal frontal lobe epilepsy also experience parasomnias. Hence a good history, capturing events on cell phone camera at home, along with VEEG and PSG/VEEG monitoring will help in differentiating the two.

Sudden unexpected death in epilepsy is a critically important entity for physicians who treat patients with epilepsy. Many pediatric neurologists are hesitant to discuss this condition with patients and families because of the lower risk in the pediatric age group. Interesting though, families would prefer if their pediatric neurologists would discuss about SUDEP during their clinic visit. The exact mechanism of SUDEP is as yet unclear. Cardiac mechanisms are likely related to cardiac dysrhythmia precipitated by seizures. Respiratory dysfunction is likely a result of abnormal neuronal activation and deactivation of the respiratory center in the brainstem during both generalized and focal seizures. The results suggested that there may be an age-related effect on cardiorespiratory changes during seizures with higher rates of central apnea and bradycardia observed in children, but a much higher prevalence of postictal generalized EEG suppression (PGES) of longer duration in adults. Eventually, post-ictal central apnea with hypoventilation could lead to a "cerebral shutdown" with generalized EEG suppression, leading eventually to SUDEP.

Several studies demonstrate that early-onset epilepsy (within the first 1-2 years of life), refractory epilepsy, developmental delay or mental retardation, and poor response to multiple antiepileptics increase the risk for SUDEP in children. Some rare epilepsy syndromes, such as Dravet syndrome (SCN1A), 15q duplication syndrome, CDKL5 disorder, PCDH19, and chromosome ring 20 syndrome, lead to a more refractory form of epilepsy and therefore place patients with these mutations at a higher risk for SUDEP. Close supervision by parents at night during sleep is supposed offer protection against SUDEP in the pediatric population.

In conclusion, sleep and epilepsy are interrelated and worsening of one worsens the other and sets up a vicious cycle. Epilepsy comorbidities of poor behavior, quality of life, and memory are further worsened by poor sleep. Moreover, sleep disorders are very common and treatment of them may improve seizure control. Hence, education on improving sleep quality and screening, evaluation, and treatment for sleep problems should be a part of routine care in patients with epilepsy.

References:

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