Sleep and Epilepsy

Lynn Kataria, MD[a], Bradley V. Vaughn, MD[b,*]

KEYWORDS

• Sleep • Epilepsy • Pharmacologic • Nonpharmacologic

KEY POINTS

- Epilepsy can fragment sleep and can change sleep architecture.
- Epilepsy therapies can influence sleep and produce sleep symptoms.
- Sleep can create a state that is conducive for some forms of epilepsy.
- Non-rapid eye movement sleep promotes interictal activity, whereas rapid eye movement sleep inhibits interictal activity.
- Sleep disorders such as obstructive sleep apnea make recurrent seizures more likely, and their treatment may help reduce recurrent seizures.

INTRODUCTION

Sleep and epilepsy have a complex relationship. This relationship has been recognized since early descriptions of Aristotle and Hippocrates. In the latter 1800s, Gower[1] studied the association between sleep and epilepsy and found that 21% of patients had seizures exclusively during sleep. The influence of sleep on epilepsy was later discovered to be sleep stage specific because interictal and ictal discharges were observed predominantly in non-rapid eye movement (NREM) sleep and suppressed during rapid eye movement (REM) sleep. This influence of sleep was also found to be a characteristic of some epilepsy syndromes such as benign childhood epilepsy with centrotemporal spikes or autosomal-dominant nocturnal frontal lobe epilepsy (ADNFLE). Furthermore, sleep disruption was also found to increase the likelihood of recurrent seizures.

Sleep deprivation can facilitate seizure occurrence, although it is unclear if this is due to the onset of sleep or activation from sleep loss.[2–4] Sleep architecture can also be disturbed in patients with epilepsy.[5–7] Increased seizure frequency can lead to sleep fragmentation, resulting in a constellation of symptoms impairing daytime function, and similarly, the therapies for epilepsy can produce sleep-related symptoms and substantially alter sleep architecture. Nonetheless, patients with epilepsy frequently have complaints regarding sleep primarily in the domains of excessive daytime sleepiness (EDS), insomnia, or other nocturnal events (**Box 1**).[8–10] Similar to the impact of voluntary sleep deprivation, questions arose as to the effect of primary sleep disorders on epilepsy. Studies of a common sleep disorder, obstructive sleep apnea (OSA), which causes sleep fragmentation and sleep deprivation, was found to increase recurrent seizures.[11] Further work showed that treatment with positive airway pressure (PAP) improved seizure frequency in patients with epilepsy and OSA.[12] Other sleep-related events such as parasomnias, or non-epileptic nocturnal events, can be difficult to distinguish from epileptic seizures and require clinicians' further investigation to distinguish. In this article, the dynamic interplay of sleep and epilepsy through the information gained from studies

[a] Sleep Medicine Section, Department of Neurology, Washington DC Veterans Affairs Medical Center, George Washington University School of Medicine, 50 Irving Street NW, Washington, DC 22042, USA; [b] Department of Neurology, University of North Carolina School of Medicine, Chapel Hill, NC, USA
* Corresponding author. 2122 Physician Office Building, CB # 7025 Department of Neurology, University of North Carolina School of Medicine, Chapel Hill, NC 27599-7025.
E-mail address: vaughnb@neurology.unc.edu

Sleep Med Clin 11 (2016) 25–38
http://dx.doi.org/10.1016/j.jsmc.2015.10.008
1556-407X/16/$ – see front matter

Box 1
Sleep complaints in patients with epilepsy

- Insomnia
- Hypersomnia
- Nocturnal events

examining sleep stage, sleep deprivation, the effects of treatment regimen, and the impact of other sleep disorders are explored.

PATIENT EVALUATION OVERVIEW

The patient with epilepsy may have 3 major areas of concern for the clinician. For some patients, sleep may influence their epilepsy, and sleep-related complaints might indicate an underlying sleep disorder. For others, the epilepsy or the therapies may disturb sleep, and some may have nocturnal events. Each of these deserves clinical inspection, and the symptoms of such may not be readily offered.

Approximately one-third to one-half of patients with epilepsy will have a sleep-related complaint. A systematic approach should be taken when looking at sleep disturbances in patients with epilepsy (**Box 2**). A detailed clinical history should focus on both major aspects: the epilepsy and their sleep. In regards to their epilepsy, understanding the type of seizures, time of occurrence, seizure frequency and intensity, as well as the medication regimen is important. From the sleep perspective, the clinician will need to understand the patient's sleep complaint and what appears to influence the issues. The clinician will also want to gather the patient's sleep/wake schedule, including non-workday routines, the sleep environment, typical sleep habits, including other substance use (caffeine, alcohol, herbs, and so on), and a good description from bed partner history, including any unusual nocturnal events, snoring, and witnessed apneic events. Clinicians may garner circadian clues from knowing when patients prefer to sleep and when they feel their most awake. Patients also should describe their understanding of how sleep may influence their epilepsy. An occupational history may also give clues to sleep and circadian rhythm disorders, such as shift work disorder that may put one at risk for sleep deprivation. Lower melatonin levels have been found in patients with refractory epilepsy compared with healthy controls.[13] Seizures and medications used in the treatment of epilepsy can also attenuate or induce brief shifts in the circadian rhythm.[14]

Box 2
Approach to evaluating sleep complaints in patients with epilepsy

Sleep history
- Bedtimes and wake times
- Bedroom environment
- History of underlying sleep disorder such as OSA or RLS
- History of snoring or witnessed apneas
- Screening for maladaptive behaviors
- History from bed partner
- Presence of insomnia or hypersomnia (ESS)

Seizure history
- Frequency and duration
- AED dosage, timing, and adverse effects

Caffeine/alcohol/illicit drug history

Comorbid medical and psychiatric conditions

Review of active medications including over-the-counter medications

Occupational history

The presence of an underlying sleep disorder can affect seizure frequency. Patients with epilepsy should be questioned about the presence of other sleep disorders, such as OSA, restless legs syndrome (RLS), insomnia, and disorders of hypersomnia, such as narcolepsy. Although it has not been validated in epilepsy patients, the Epworth Sleepiness Scale (ESS) can be used in the evaluation of EDS in epilepsy patients for the presence of these sleep disorders. A score of 10 or greater represents clinically significant sleepiness. Malow and colleagues[9] showed that the elevated scores on the ESS were associated with symptoms of OSA and RLS as opposed to seizure frequency or number or type of antiepileptic medication.

Clinical manifestations of OSA include EDS, snoring, and witnessed apneic events by a bed partner. Polysomnography (PSG) is indicated for the confirmation of the diagnosis of OSA. OSA prevalence rates ranging from 4% to 33% have been reported in patients with epilepsy.[15,16] Given the high prevalence in patients with epilepsy, OSA should be strongly considered as part of the differential diagnosis in patients presenting with sleep disruption and EDS.

RLS involves patients having uncomfortable and unpleasant sensations in their legs primarily