ABSTRACT

Sleep concerns are common in epilepsy. Although epilepsy often contributes to sleep difficulties, many epilepsy patients exhibit one of several different types of sleep difficulties independent of their epilepsy. A careful history helps to differentiate the causes of such sleep problems. Comorbidity between epilepsy and sleep disorders has been shown to exist, and in these cases, resolving the underlying sleep disorder may in turn affect seizure control. In other cases in which epilepsy impacts sleep, the adjustment of antiepileptic treatment may be effective in resolving the abnormal sleep condition.

This article presents and examines sleep concerns in general and then considers how these disorders apply to epileptic patients. The common categories of sleep concerns in epilepsy are discussed. Consideration is given to taking a basic sleep history of the patient with epilepsy to identify the key causes of insomnia and daytime sleepiness that are not necessarily related to the epilepsy. Practical treatment guidelines that may assist in the resolution of the sleep issues involved are presented.


The relationship between sleep and epilepsy is complex. Sleep disorders occur in people with and without epilepsy, and the study of the differences in the nature and intensity of sleep disorders in both groups can lead to a greater understanding of both sleep and epilepsy. Sleep disorders, including insomnia, are common in the general population and no less common in individuals who have epilepsy. This article therefore examines sleep concerns in general and then considers how they specifically apply to patients with epilepsy.

COMMON SLEEP CONCERNS IN PATIENTS WITH EPILEPSY

Most sleep difficulties reported by patients with epilepsy fall into 1 of 3 categories: (1) The patient cannot fall asleep or stay asleep; (2) The patient is sleepy during the day; and (3) The patient does unusual things in his or her sleep, such as loud snoring or unusual movement.

DIFFICULTY SLEEPING

The first concern is one of sleep efficiency. Although there are studies that have found sleep disturbances in epilepsy patients, more studies are needed. One study by Touchon et al compared 80 patients with epilepsy with 17 healthy, age-matched, sex-matched, nonepileptic controls. Even in the absence of seizure activity, sleep in the epilepsy group was characterized by a marked instability compared with normal subjects. Overall, the patients with epilepsy in this study had decreased sleep efficiency compared with controls without epilepsy—ie, the ratio of the time that they were asleep compared with the time that they were in bed was diminished. They experienced an increase in sleep-stage shifts, moving in and out of sleep. Both the number and the duration of awakenings increased. These parameters were most affected in
untreated newly diagnosed patients, so these sleep disturbances were not likely the result of antiseizure medication side effects. It is apparent that epilepsy may have a direct adverse effect upon sleep even when seizures are not taking place.

There has been a tendency to blame antiepileptic drugs (AEDs) for sleep disturbances, because of sedation and other side effects, although the study by Touchon et al and other studies contradict this idea. Careful matching of the AED profile to the patient’s needs is potentially beneficial regarding sleep disturbances. For example, a patient with insomnia could be given a mildly sedating AED. Other studies that have focused on sleep disturbances in patients with epilepsy described findings of increased latency to sleep onset, increased number and duration of awakenings, abnormal sleep spindles and K-complexes, increased number of stage shifts, and decreased or fragmented rapid eye movement (REM) sleep, as well as the decreased sleep efficiency described above.

Sleep disturbances can be a direct result of epilepsy itself, even in the absence of seizures or medication, with the extent of the sleep abnormality sometimes related to the severity of the epilepsy. However, it is important when diagnosing sleep disorders to consider the whole person. A variety of other factors may influence sleep concerns—some related to the epilepsy, others completely independent. Among the possibilities to consider are stress-related insomnia; adverse medication effects (eg, felbamate, lamotrigine); and coexisting medical or psychiatric disorders (common in epilepsy), such as arthritis, fibromyalgia, anxiety, or depression. Anxiety often results in difficulty falling asleep or in nocturnal panic. Depression can also cause difficulty falling asleep, as well as waking during the night followed by inability to resume sleep.

Obstructive sleep apnea and restless leg syndrome are 2 primary sleep disorders that should be considered in patients with epilepsy who have sleep difficulties. Obstructive sleep apnea, a medical problem involving repetitive cycles of snoring, airway collapse, and arousal, can wake people from sleep. Restless leg syndrome can either keep people from falling asleep initially or, when they awaken, it can keep them from going back to sleep because of the “creepy, crawling, annoying” sensation in the legs.

When taking a history from a patient with epilepsy, it is important to ask about each of these possibilities and not to automatically attribute the sleep disruption to the disease process or its treatments. Important considerations include other medical disorders, psychiatric disorders, and primary sleep disorders. Does the patient snore loudly? Has the spouse or bed partner witnessed apneas? Does the patient wake up with a dry mouth that could suggest obstructive apnea? Does the patient wake up with a dry mouth that could suggest obstructive apnea? Does he or she experience creepy, crawling sensations in their legs that are worse in bed at night? What about his or her habits? Both caffeine and alcohol can contribute to difficulty sleeping. Alcohol is often thought of as a sedative, but it can actually disrupt sleep, particularly in the second part of the night. Posing such questions to the patient with epilepsy who suffers from a sleep disturbance might yield insight into underlying causes that are not related to the epileptic condition.

Insomnia is very common in the general population, with approximately 10% of adults reporting chronic insomnia. For the patient with epilepsy, the approach should be the same as that for the general population, with the exception of identifying and treating the underlying causes. In the general population, medication is generally avoided for those with chronic insomnia, although those with acute insomnia or anxiety disorders may receive pharmacologic treatment, as may those undergoing behavioral treatment. For patients with epilepsy, although specific drugs are typically not added for chronic insomnia, the AED therapy can be tailored to assist with the problem. Polysomnography is not indicated unless there is a concern about the presence of a primary sleep disorder (eg, obstructive sleep apnea) causing insomnia.

It is important to be able to recognize psychophysologic insomnia, the most common type of insomnia, which involves a disorder of initiating and maintaining sleep. Patients with this disorder may initially experience a few nights of insomnia, perhaps because of a major stressor (eg, a move or a death in the family). As a result of this, the patient actually learns behavior that prevents sleep. This often takes the form of overconcern with the inability to sleep, with consequent exaggerated “remedial” behaviors that actually worsen the situation. For example, an individual becomes concerned that he/she will oversleep as a result of the insomnia, so he/she purchases a large, noisy alarm clock with neon lights, which further distracts him/her from sleep. As a result, this person has more difficulty getting to sleep, wakes more frequently, and soon comes to associate the bedroom with not sleeping (conditioned arousal). The individual has actually con-
ditioned himself/herself to not sleep and thus begins using stimulants to stay awake during the day and alcohol to go to sleep at night. This person has developed inadequate sleep hygiene.

Figure 1 illustrates the model that Spielman et al proposed in the 1980s for insomnia: a precipitating factor (eg, a new job, a medical or psychiatric condition, or a medication)—if it occurs together with an underlying predisposition (eg, personality, age)—may cause acute insomnia. At this point, the individual may rapidly become conditioned to the situation and perpetuate it by abusing alcohol or caffeine or by taking naps during the day to overcome daytime sleepiness and not sleeping well at night. It is possible that the sleep disturbances caused by epilepsy could function as a predisposing factor in this model. Further study is needed for clarification of this theory.

INTERVENTIONS

When counseling patients with epilepsy who have psychophysiologic insomnia, the same approach can be taken as with the general population. Consider the whole patient; ask about sleep-related habits. Stimulus control helps to remove poor conditioning so that the patient can learn once again to associate the bedroom and the bed with sleep (see Sidebar).

Sleep restriction is also an effective, common-sense approach to reversing poor sleep hygiene. Many patients go to bed earlier and earlier in an effort to ensure sleep, but only lie awake for several hours as a result. Instructing the patient to delay going to bed until perhaps midnight will break this cycle of behavior. Once the patient relearns falling to sleep soon after retiring, bedtime can be gradually adjusted to suit individual needs.

Other components of good sleep hygiene include participating in physical exercise (not too soon before bed to avoid stimulation); avoiding alcohol, cigarettes, and caffeine; ensuring comfortable temperatures and sound levels in the bedroom; and avoiding large meals just before bed (a light snack is permissible). A very important item—although perhaps not the easiest to implement—is to avoid taking worry-provoking problems to bed.

DAYTIME DROWSINESS

Daytime drowsiness is common among patients with epilepsy and may be a direct result of the disease. A recent study examined vagus nerve stimulation (VNS) and its effect on alertness (Figure 2). The baseline column of the Figure shows sleep latency for patients in a multiple sleep latency test. The test is performed the night after an overnight polysomnogram as a method of documenting an individual’s degree of sleepiness. Subjects are given 4 chances to nap during the day, and the time taken to fall asleep is measured by electroencephalography (EEG). Sleep latency for normal adults under these circumstances is 10 minutes.

Figure 1. Factors Affecting the Development of Insomnia


Steps of Stimulus Control

- Go to bed only when sleepy.
- Do not use the bed for any activities other than sleep (or sex).
- Do not read, watch television, or eat in bed.
- If you do not fall asleep in about 15 to 20 minutes, leave the bedroom. Return to bed when you are sleepy. Repeat this step as necessary.
- Get up at the same time each day regardless of how much you slept.
- Do not nap during the day or sleep in locations other than your bed.
or more. If sleep latency drops to 8 minutes or less, the patient is considered to be excessively sleepy. If latency is 5 minutes or less, sleepiness is considered to be severe. In this study, the subjects were all medically refractory epilepsy patients. Most of the patients fell asleep within 8 minutes, and some patients fell asleep within 5 minutes, an indication that these patients were experiencing undue sleepiness. The second set of data compares the sleep latency of the same patients after treatment with VNS. Sleep latency improved considerably, with a corresponding improvement in alertness. This is another demonstration of the concept that antiepileptic treatments—pharmacologic and nonpharmacologic—can sometimes benefit patients with coexisting sleep disorders.

Once again, however, in the case of daytime sleepiness, it is important to consider the whole patient. Even if epilepsy or its treatments are playing a direct role in daytime drowsiness, a careful history may reveal other contributing factors. Whether a patient does or does not have epilepsy, a systematic approach can be revealing. The primary cause for sleepiness in the daytime is—unsurprisingly—in sufficient sleep at night. Modern life often leaves people with insufficient time for sleep, and chronic sleep deprivation is widespread. The possibility of chronic sleep deprivation should be thoroughly explored. What time does the patient want to go to sleep? What time does the patient wake up? Is the patient sleeping throughout the night? How many naps does the patient take during the day? Is the patient sleeping late on weekends (which also suggests sleep deprivation)? Even if the patient is taking enough time for sleep, sleep may be disrupted by seizures or a sleep disorder, such as apnea, periodic limb movements of sleep, or frequent awakening due to a medical disorder. If the amount and quality of sleep seem adequate, the patient could have an intrinsic sleep disorder, such as narcolepsy or idiopathic hypersomnolence. Epilepsy may also be a cause of the intrinsic sleep disorder. The possibility of adverse effects of medications must be kept in mind—many AEDs are associated with sedation. Sometimes, the symptoms are those of fatigue rather than sleepiness per se; this could be a sign of depression.

The following case history illustrates the importance of taking a holistic approach when investigating daytime drowsiness.

**CASE STUDY 1**

The patient is a 61-year-old man who experienced his first seizure during sleep at age 33 in a setting of viral encephalitis. His seizures were well controlled with medication for 20 years but then increased in frequency to several per week. The patient reported daytime sleepiness and a 20-lb weight gain. He is wife noted that he snored heavily and occasionally stopped breathing during sleep. Overnight polysomnography showed an apnea/hypopnea index of 15.9 events per hour, with a minimum oxygen saturation of 86%. A multiple sleep latency test the next day revealed mild daytime sleepiness. He was prescribed continuous positive airway pressure (CPAP), a pneumatic splint that keeps the airway open by putting pressure into the back of the throat. His AED dosages were kept constant. This patient became seizure free; he reported that his seizure control returned to the way it had been for many years and that he was experiencing improved daytime alertness.

Other studies have reported success in controlling seizures by treating sleep apnea:

- Tracheostomy diminished generalized seizures in 1 patient.
- CPAP or other therapy improved seizure control.

The following case history illustrates the importance of taking a holistic approach when investigating daytime drowsiness.

**CASE STUDY 1**

The patient is a 61-year-old man who experienced his first seizure during sleep at age 33 in a setting of viral encephalitis. His seizures were well controlled with medication for 20 years but then increased in frequency to several per week. The patient reported daytime sleepiness and a 20-lb weight gain. His wife noted that he snored heavily and occasionally stopped breathing during sleep. Overnight polysomnography showed an apnea/hypopnea index of 15.9 events per hour, with a minimum oxygen saturation of 86%. A multiple sleep latency test the next day revealed mild daytime sleepiness. He was prescribed continuous positive airway pressure (CPAP), a pneumatic splint that keeps the airway open by putting pressure into the back of the throat. His AED dosages were kept constant. This patient became seizure free; he reported that his seizure control returned to the way it had been for many years and that he was experiencing improved daytime alertness.

Other studies have reported success in controlling seizures by treating sleep apnea:

- Tracheostomy diminished generalized seizures in 1 patient.
- CPAP or other therapy improved seizure control.

The following case history illustrates the importance of taking a holistic approach when investigating daytime drowsiness.

**CASE STUDY 1**

The patient is a 61-year-old man who experienced his first seizure during sleep at age 33 in a setting of viral encephalitis. His seizures were well controlled with medication for 20 years but then increased in frequency to several per week. The patient reported daytime sleepiness and a 20-lb weight gain. His wife noted that he snored heavily and occasionally stopped breathing during sleep. Overnight polysomnography showed an apnea/hypopnea index of 15.9 events per hour, with a minimum oxygen saturation of 86%. A multiple sleep latency test the next day revealed mild daytime sleepiness. He was prescribed continuous positive airway pressure (CPAP), a pneumatic splint that keeps the airway open by putting pressure into the back of the throat. His AED dosages were kept constant. This patient became seizure free; he reported that his seizure control returned to the way it had been for many years and that he was experiencing improved daytime alertness.

Other studies have reported success in controlling seizures by treating sleep apnea:

- Tracheostomy diminished generalized seizures in 1 patient.
- CPAP or other therapy improved seizure control.

The following case history illustrates the importance of taking a holistic approach when investigating daytime drowsiness.

**CASE STUDY 1**

The patient is a 61-year-old man who experienced his first seizure during sleep at age 33 in a setting of viral encephalitis. His seizures were well controlled with medication for 20 years but then increased in frequency to several per week. The patient reported daytime sleepiness and a 20-lb weight gain. His wife noted that he snored heavily and occasionally stopped breathing during sleep. Overnight polysomnography showed an apnea/hypopnea index of 15.9 events per hour, with a minimum oxygen saturation of 86%. A multiple sleep latency test the next day revealed mild daytime sleepiness. He was prescribed continuous positive airway pressure (CPAP), a pneumatic splint that keeps the airway open by putting pressure into the back of the throat. His AED dosages were kept constant. This patient became seizure free; he reported that his seizure control returned to the way it had been for many years and that he was experiencing improved daytime alertness.

Other studies have reported success in controlling seizures by treating sleep apnea:

- Tracheostomy diminished generalized seizures in 1 patient.
- CPAP or other therapy improved seizure control.
and daytime alertness in 6 of 7 patients with partial seizures.16

• CPAP or positional therapy improved seizure control in 7 of 10 patients with seizures and obstructive sleep apnea. Three had antiepileptic medications optimized.17

• CPAP improved seizure control or daytime sleepiness in 7 of 9 patients.14

Pediatric studies have also found similar benefits of sleep apnea treatment to the symptoms of epilepsy. The precise reasons for the relationship between sleep apnea treatment and reduction in daytime drowsiness and seizure activity are unknown; possibilities include the reduction of sleep deprivation or improvements in consolidation of sleep at night.

When treating daytime sleepiness, it is important to identify the cause. Polysomnography can be a useful diagnostic tool. Once the etiology has been determined, treatment choices become clear. If the sleepiness is seizure related, then an increase in AED’s may be required, or alternatives may be considered, (eg, surgery for frequent seizures). Conversely, if the sleepiness is caused by side effects of AED therapy, the aim may be to reduce polytherapy, determine the lowest effective dose, space out the patient’s dosing, or switch medications. If the drowsiness is due to a coexisting sleep disorder (eg, sleep apnea, periodic limb movements of sleep, narcolepsy), treatment should be directed at the specific disorder.

**Sleep Attacks**

Sleep attacks can confuse the clinical picture. They are not necessarily associated with narcolepsy; narcolepsy can occur without sleep attacks and vice versa. Sleep attacks can be associated with other sleep disorders, such as restless leg syndrome and sleep apnea, and can be disabling to the patient. The patient falls irresistibly asleep, and the sudden loss of consciousness can be mistaken for seizures or pseudoseizures.18 The following case study demonstrates the importance of correctly diagnosing sleep attacks and the associated challenges.

**Case Study 2**

An 18-year-old woman described brief spells of impairment of consciousness preceded by a stereotyped sensation of a “head rush” and consisting of 5 to 10 seconds of lost awareness, with eyes rolled back and fluttering, followed by eye closure and unresponsiveness.19 She stated that she could not focus and that she felt in a daze during these episodes.

The patient experienced no staring, tonic-clonic activity, automatisms, oral trauma, or bladder or bowel incontinence during these episodes. She regained responsiveness very quickly, without postevent confusion, but was not aware of what was happening during the spell. She was involved in a motor vehicle accident during one of these episodes, which prompted her to seek medical attention. She had no symptoms of narcolepsy: cataplexy, sleep paralysis, or hypnagogic hallucinations. The events occurred regardless of sitting or standing position, but she never fell during an event. They occurred 4 to 10 times per day and increased in frequency when she was tired or emotionally upset. She denied a syncope prodrome (feeling warm or weak). Video EEG monitoring was inconclusive for epileptic seizures. She was prescribed an empiric trial of carbamazepine and reported increased daytime sleepiness. Polysomnography with a multiple sleep latency test was performed after a 2-week period of discontinuing carbamazepine and achieving 8 hours of sleep per night. The overnight sleep study was normal except for some increased arousals. The multiple sleep latency tests did show that she fell asleep on average in 3.7 minutes, and she also went into REM sleep on 3 of the 5 naps, which is diagnostic of narcolepsy. She began treatment with modafinil for narcolepsy and her episodes of loss of awareness resolved completely, as did her excessive daytime sleepiness.

**Summary**

Sleep complaints can be categorized into 1 of 3 categories: difficulty falling or staying asleep, difficulty staying awake during the day (which includes daytime sleep attacks), and unusual behaviors during sleep. Patients may simultaneously experience difficulties in 1, 2, or all 3 categories. Epilepsy and/or its treatments can be a direct cause of sleep difficulties, or conversely, may be unconnected. The physician should not assume a connection. A sleep history can help to determine cause of a sleep disorder. Once diagnosed, any sleep disorders that are not associated with the epileptic condition are readily treatable and can impact favorably on patients’ overall health and quality of life. Where epilepsy is a factor, adjustment of the epilepsy treatment regimen may be sufficient to ameliorate the problem.
REFERENCES


