신경과의사가 수면무호흡을 보는 시선: 왜 수면무호흡에 관심을 가져야 하는가?

이 원 구
고신대학교 의과대학 신경과학 교실

Sleep apnea in Neurological disorders

Won Gu Lee, MD
Department of Neurology, Kosin University College of Medicine, Busan, Korea

Sleep problems are frequently associated with neurological disorders. Sleep disorders interfere with recovery of patients with neurological disorders such as stroke and may increase the severity of their symptoms. The treatment of sleep apnea syndrome is particularly important in managing patients with cerebral infarction of whom 50-60% have moderate to severe sleep apnea. Neurodegenerative diseases result from deterioration of neurons which may eventually lead to central nervous system-related dysfunction including sleep disorders. The pathogenesis of these disturbances may be secondary to direct structural alterations of the sleep-wake generating cells and networks or be the consequence of several indirect mechanisms. The most frequent sleep disturbances in patients with neurodegenerative diseases are insomnia, hypersomnia, parasomnias, excessive nocturnal motor activity, circadian sleep-wake rhythm disturbances, and respiratory dysrhythmias. Parkinson's disease and epilepsy are other neurological disorders that may have sleep disturbances.

Key words: Sleep disorders, sleep apnea, neurological disorder

Introduction

Obstructive sleep apnea (OSA) is the most common sleep-related breathing disorder characterized by repetitive episodes of complete or partial obstruction of the upper airway. The prevalence of this disorder is strictly dependent on its gravity. The hypoxia induced by OSA severely affects the structure and function of blood vessels, culminating in mortality and morbidity. Its negative impact influences also cognitive functioning. Recent papers showed the relationship between OSA and some neurological disorders, such as neurodegenerative diseases, stroke, epilepsy, and headache. OSA may accelerate the onset of mild cognitive impairment and Alzheimer's disease (AD) and might also represent an independent risk factor for Parkinson's disease (PD). OSA is also frequent in multisystem atrophy. In the early stages of AD, continuous positive airway pressure (CPAP) treatment might slow down the progression of the disease, thus highlighting the potential importance of OSA screening and a timely intervention in these patients. Moreover, CPAP is effective in reducing daytime sleepiness in PD. OSA may induce seizures by means of sleep disruption and deprivation, as well as cerebral hypoxemia with consequent oxidative stress. It has been demonstrated that CPAP treatment is efficacious in controlling epileptic seizures. OSA can represent a risk factor for stroke and death, mainly related to the endothelial

Won Gu Lee, MD
Department of Neurology, Kosin University College of Medicine, Busan, Korea
E-mail: neogio219@hanmail.net

dysfunction, with the formation of atherosclerosis caused by hypoxia through oxidative stress. CPAP treatment in patients with OSA and stroke, if delivered in the early stages, is able to increase the magnitude of neurologic improvement after the vascular accident. There is a strong association between OSA and headache. In particular, there is a "sleep apnea headache" described as a recurrent morning headache, with resolution after effective treatment of sleep apnea. This review clearly shows the importance of taking a sleep history in neurological patients and considering the diagnosis and specific treatment of OSA in these patients.

Main text

1) Cerebrovascular disorders and sleep disturbances

OSA is a common finding in both stroke patients and in ischemic stroke patients; it is also an independent risk factor for all stroke patients.[1,2] Given the prevalence of OSA, all stroke patients should be screened for OSA at the time of presentation of stroke using polysomnography.[3] Knowing the etiology of a patient's stroke offers a better opportunity to provide more effective treatment for stroke patients. Understanding the underlying cause of a stroke can help prevent recurrent strokes. One-third of strokes are the consequence of a patient's previous history of stroke. OSA in stroke patients, if not treated, could lead to a recurrent stroke; therefore, addressing the management of OSA is a key to preventative health care in stroke patients.[4] As OSA is an increasingly common finding in stroke patients, CPAP therapy has proven to have beneficial effects in terms of improving neurological symptoms in stroke patients. Stroke patients with OSA have a worse prognosis overall, but treatment with CPAP can have a significantly better impact on overall cognitive and other physical disabilities suffered after stroke.[5] Compliance with CPAP therapy improves overall neurological and physical health status in stroke patients with OSA.[6]

2) Neurodegerative disease and sleep disturbances

Neurodegenerative diseases such as AD and Parkinson's disease (PD) are increasingly prevalent

with advancing age. PD, which is characterized by its hallmark motor features of tremor, bradykinesia, rigidity, and postural instability, together with important non-motor symptoms including cognitive dysfunction, is the second most frequent and the fastest growing neurodegenerative disease.[7] Sleep disturbances are frequently found in PD, where the prevalence is estimated to be as high as 60% to 90%.[8] These include alterations of sleep architecture, insomnia, hypersomnia, restless legs syndrome, rapid-eye movement sleep behavior disorder (RBD), which can precede the appearance of motor symptoms, and sleep-related breathing disorders. [9,10] It is estimated that 20% to 60% of PD patients have concomitant OSA.[11] Whether PD increases OSA prevalence is still largely debated. Nevertheless, there is biologic plausibility for PD to be involved in the pathogenesis of OSA. Conversely, OSA appears to have a detrimental impact on brain structure and function. Thus, when already affected by a neurodegenerative process, the brain could be more vulnerable to the additional effects of OSA.

3) epilepsy and sleep disturbances

The prevalence of epilepsy ranges from 0.5 to 1%.[12] Approximately 25% of these individuals will experience their first seizure in adulthood, with a peak in incidence for those aged 65 years and older.[13,14] The etiology of 20-38% of adult onset epilepsy remains unclear despite extensive investigation, but precipitating factors, including untreated obstructive sleep apnea (OSA), have been associated with seizure facilitation in susceptible populations.[15] Posited mechanisms of seizure facilitation in patients with untreated OSA include sleep fragmentation, cerebral hypoxemia, and cardiac dysfunction. Treatment of OSA with continuous positive airway pressure (CPAP) has been demonstrated to

improve seizure control, as well as to decrease interictal activity [16], supporting the role of untreated OSA in seizure facilitation. This suggests that, as a modifiable risk factor, OSA should be evaluated in patients with late-onset seizures. The following case describes a patient who presented with late-onset epilepsy after being diagnosed with OSA, with further seizure exacerbation during noncompliance with CPAP, and highlights the importance of recognizing and treating OSA in late-onset epilepsy.

Conclusions

The relationship between OSA and neurological disorders remains complex. A body of evidence suggests that OSA should be addressed as secondary stroke prevention. There is some evidence that OSA treatment in patients with epilepsy can help improve seizure control. Treating OSA in patients with disorders of cognition, headache and Parkinson's disease might be beneficial.

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