Editor's Note:

Obstructive sleep apnea (OSA) is associated with numerous comorbid conditions. In many, a causative relationship has either been well established or is strongly associated. As the knowledge of sleep-disordered breathing and its consequences continues to grow, so does the list of associated or consequential conditions. The following is part 5 of a 5-part series exploring more recently identified consequences of OSA.

Introduction

Approximately 1.7 million people sustain a traumatic brain injury (TBI) every year in the United States, with 1.4 million seeking treatment, 250,000 hospitalizations, and 50,000 deaths.[1-3] Mild TBI comprises the majority of cases (70%-90%).[4]

Sleep disturbances occur with increased frequency in patients with TBI compared with the general population. Subjective complaints of sleep/wake disturbances are exceedingly common, with sleep fragmentation, insomnia, impaired daytime functioning, or hypersomnolence reported in 46%-98% of patients.[3,5-13] Objective sleep/wake disturbances have been observed in up to 72.5% of these patients.[3,5,8,10] When present, sleep disturbances can adversely affect outcomes.

Baumann and colleagues[9] evaluated 96 patients 4 days after injury, and 65 individuals were reevaluated 6 months later. All individuals underwent comprehensive evaluations, including subjective questionnaires, neuroimaging, laboratory studies, and objective measures of sleep, including overnight polysomnography, multiple sleep latency testing, maintenance of wakefulness testing, and actigraphy. Daytime somnolence was reported in 28% of the cohort. The majority of patients (72%) developed new sleep disorders after their injury. Objective criteria for posttraumatic hypersomnia were met in 22% of participants.

Development of OSA After TBI

Sleep-disordered breathing is common after TBI and develops in 12%-36% of patients.[3,5,7,10,11] In a retrospective study of 60 adults with TBI (40% mild severity, 20% moderate, and 40% severe), Verma and colleagues[7] found that 50% reported daytime hypersomnia and 30% were diagnosed with OSA. Similarly, Castriotta and colleagues[12] evaluated 10 randomly selected patients with TBI. Of these, 7 were found to have sleep-disordered breathing and 3 met criteria for posttraumatic narcolepsy or posttraumatic hypersomnia.

In a separate study, Castriotta and colleagues[10] prospectively evaluated 87 patients at least 3 months after a TBI. Polysomnography was abnormal in 46% of patients; 23% of patients were diagnosed with OSA, 11% with posttraumatic hypersomnia, 6% with posttraumatic narcolepsy, and 7% with periodic limb movement disorder. The study found no correlation between subjective and objective measures of sleepiness. No significant differences in age, race, sex, level of education, injury severity, or time after injury were found between those with and without concomitant sleep disorders.

Collen and colleagues[5] assessed 116 consecutive soldiers who sustained mild to moderate TBI while serving in Iraq and Afghanistan. Among the cohort, 96.6% were men, with a mean age of 31.1 ± 9.8 years and a mean body mass index of 27.8 ± 4.1 kg/m². All participants underwent comprehensive sleep evaluations, including polysomnography and multiple sleep latency testing. Nearly all patients (97.4%) reported subjective sleep complaints, with hypersomnia and sleep fragmentation reported in 85.2% and 54.3%, respectively.

Obstructive sleep apnea syndrome (OSAS) was found in 34.5%, whereas 55.2% had insomnia. Of note, the authors observed that the mechanism of injury affected both subjective sleep complaints and objective findings. Patients with blast injuries developed more anxiety (50.6% vs 20.0%; P = .002) and insomnia (63% vs 40%; P = .02), whereas patients with blunt trauma had significantly more OSAS (54.3% vs 25.9%; P = .003). In multivariate analysis, blunt trauma was a significant predictor of OSAS (odds ratio, 3.09; 95% confidence interval, 1.02-9.38; P = .047).
Impact of OSA on Outcomes

Impaired sleep can have an adverse impact on cognition, attention, and judgment. Among patients with TBI, the presence of sleep complaints portends worse outcomes, is associated with diminished quality-of-life measures, and has been shown to impair rehabilitation efforts and progression.

Failure to recognize sleep disorders in TBI may adversely affect recovery. Wilde and colleagues[13] assessed the impact of sleep disturbances on cognition in a clinical trial comparing 19 patients who had TBI and OSA with 16 patients who had only TBI. The 2 groups were similar in age, education, presenting Glasgow Coma Scale score, and time since injury. Patients with TBI and OSA performed worse on measures of verbal and visual delayed recall, and comparably on motor, visual construction, and attention tasks. Researchers also found more lapses in attention in those with both conditions. The authors concluded that TBI coupled with OSA is associated with significant impairments of sustained attention and memory compared with patients who have TBI alone.

Castriotta and colleagues[11] evaluated the impact of therapy for sleep disorders in 57 patients at least 3 months after a TBI. Of the cohort, 23% had OSA. The authors found that although continuous positive airway pressure effectively ablated obstructive events, it did not lead to improvement in objective measures of sleepiness. Similar to other reports, TBI patients may have additional causes of persistent sleepiness, in particular a centrally mediated posttraumatic hypersomnia syndrome.

Conclusions

TBI is a growing societal concern that is increasingly recognized among athletes, elderly persons, and military personnel. These injuries encompass multifaceted disease processes and are commonly associated with psychiatric conditions (depression, PTSD, and anxiety), neuromuscular and neurocognitive impairments (chronic pain, physical rehabilitation, and impaired cognition), and sleep-related disorders (sleep apnea, posttraumatic hypersomnia, periodic limb movement disorder, insomnia, and circadian rhythm sleep disturbances). Sleep disorders in patients with TBI are often underdiagnosed and undertreated.

There is increasing recognition that sleep disruption can complicate TBI, and unrecognized or untreated sleep disorders can worsen outcomes, increase disability, or impair rehabilitation. Although sleep complaints are nearly universal among persons who have had a TBI, it appears that the mechanism of injury may play a role in the development of specific sleep disorders. Given the extremely high prevalence of sleep complaints, patients with TBI should be evaluated for sleep disorders or referred for formal sleep evaluations, because recognizing and treating these conditions may improve outcomes.

Because of the inherent cognitive limitations in TBI patients as reporters of their symptoms, all TBI patients with suspected sleep disturbances should undergo a comprehensive, objective evaluation, especially given the established adverse impact of sleep disruption on cognition in this already impaired population.

References


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