Assessing Mild Cognitive Impairment in Obstructive Sleep Apnea

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Primary care nurse practitioners (NPs) encounter complex patients with co-existing medical and psychiatric conditions which present differential diagnosis challenges. Obstructive sleep apnea (OSA) and adverse physical outcomes such as cardiovascular changes, cerebrovascular, metabolic dysregulation, visceral obesity and increased insulin resistance are well known (Gaines et al., 2018; Rall & Cutchen, 2019). However, psychiatric diagnoses, especially neurocognitive impairments like mild cognitive impairment (MCI) are less often assessed and diagnosed (Mubashir et al., 2019).

Obstructive sleep apnea contributes to MCI, Alzheimer's and vascular dementia (Barletta et al., 2019). Patients with OSA are 26% more likely to develop cognitive impairments (Leng et al., 2017) and OSA is considered an independent risk factor for developing cognitive impairments (Zhu and Zhao, 2018). MCI is the least commonly recognized comorbidity in patients with OSA (Ramachandran et al., 2021) with less than 12% of older adults receiving a timely diagnosis (White et al., 2022). Primary care clinicians are an important link in assessing and identifying symptoms of MCI. The American Academy of Neurology suggest early identification of MCI may facilitate the reversal of symptoms (Peterson et al., 2018).

The goals of this article are to improve the assessment, diagnosis, and treatment of MCI in OSA patients seen in a primary care setting. An overview of the connection of MCI and OSA will be reviewed along with screening tools to facilitate treatment of these conditions.

Neurocognitive Symptoms

OSA is characterized by episodes of upper airway constriction and blockage during sleep causing intermittent hypoxia, sleep fragmentation and excessive daytime sleepiness. The underlying neurocognitive changes associated with OSA are related to the pathophysiology associated with intermittent hypoxemia, oxidative stress, neuroinflammation and neurodegeneration (He et al., 2016). This contributes to reduced brain volume and loss of various cognitive abilities related to which area of the brain is affected (Sen and Tai, 2023; Lv et al., 2023). The cumulative effects can lead to attention deficit, slow processing speed and executive dysfunctions (Quan et al, 2011). Finally, quality sleep and adequate sleep are integral to cognitive functioning. Non-rapid eye movement (NREM) and Rapid Eye Movement (REM) sleep stages facilitate consolidation of new learning materials and skills (Fernades et al., 2021).

Patients may present with concerns of memory or attention, planning or problem-solving, emotional lability, occupational or social concerns; and can be mild to severe (Kysta et al., 2017). It is important to note that OSA is not causative of impaired global cognition or memory decline as seen in neurodegenerative (ND) conditions such as Alzheimer's Disease but can exacerbate these conditions (Karapin et al., 2022). Screening patients with any of these presenting symptoms may uncover MCI (Karapin et al., 2022, Ramachandran et al, 2021) and treatment of OSA can reverse these cognitive impairments and co-morbid mental health concerns (Patel & Chong, 2021).

Screening Tools

Despite a definitive diagnosis of MCI needing brain imaging and neuropsychiatric assessment, there are two screening tools available for primary care clinicians to screen targeted populations for early symptoms. The Montreal Cognitive Assessment (MoCA) questionnaire can be used as a simple and sensitive neurocognitive assessment instrument. MoCA is a 30-point test covering seven cognitive subdomains: visuospatial and executive, naming, memory, attention, language,

abstraction, delayed recall, and orientation. A bonus point is given to individuals with <12 years of education. MoCA<26 is indicative of MCI with sensitivity of 90% and specificity of 87% (Nasreddine et al., 2019). Gagnon et al. (2018) found that the MoCA was able to correctly identify 81% of participants with mild OSA and 72% of participants with moderate-to-severe OSA who had MCI. The optimal MoCA cut-off to discriminate MCI in mild OSA was 27, and 26 for participants with moderate-to-severe OSA, with very good AUC (0.85 and 0.82, respectively) and acceptable sensitivity and specificity.

The Addenbrooke's Cognitive Examination-Revised (ACE-R) is a 100-point tool that assesses six different cognitive domains: orientation, attention, memory, verbal fluency, language, and visuospatial ability (Ramachandran et al., 2021). The overall score is 100 and a score of less than 82 is suggestive of MCI. The ACE-R was developed and revised to distinguish MCI from cognitive changes of normal aging.

Implications for Practice

If OSA is suspected in an MCI patient, then diagnosis with polysomnography and treatment with a positive airway pressure device, such as a CPAP can improve MCI. In addition, using validated screening tools can help with screening for MCI and co-occurring OSA. Assisting clinicians can be managed by integrating tools into the EHR often streamline screening, referral, treatment and follow-up as seen with diabetes management (Wade et al., 2023). Next, adherence to treatment is key to improving MCI as the effects of OSA are modifiable. CPAP adherence in patients with MCI and OSA can significantly improve cognition (Shapiro, 2022). ■

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