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Editorial

When will it be time? Evaluation of OSA in stroke and TIA patients

Over the last 15 years, there has been exponential growth in research trying to understand the importance of obstructive sleep apnea (OSA) in stroke and transient ischemic attack (TIA) patients. In 2005, Yaggi et al., demonstrated that patients with an AHI ≥5 had an increased incidence of stroke or death even after adjustment for comorbidities including hypertension [1]. Our meta-analysis of stroke and sleep disordered breathing found an increased prevalence of sleep disordered breathing in stroke patients with 72% with apnea hypopnea index (AHI) > 5, 38% with AHI > 20, and only 7% with central sleep apnea [2]. The high prevalence and increased risk of stroke in OSA patients can be explained by a number of factors including increased risk of hypertension, increased arrhythmias including atrial fibrillation, increased hypercoagulability, right to left shunting through patent foramen ovale, increased atherosclerosis, and endothelial damage especially in the carotid arteries from hypoxia and snoring [3].

OSA also has decremental effects on recovery after stroke and longer time spent in rehabilitation, and small-randomized trials have shown benefit in stroke recovery with continuous positive airway pressure (CPAP) [4–6]. Despite these reasons to believe that treating OSA with CPAP is an important part of risk factor reduction and stroke recovery, guidelines still do not strongly recommend evaluation and treatment. The American Heart Association (AHA) 2014 guideline for secondary prevention of stroke and TIA state that sleep studies and CPAP can be considered [7]. The initial 2018 AHA/American Stroke Association (ASA) Guidelines for acute management of ischemic stroke patients had a similar recommendation, but a retraction removed the guideline for routine screening of patients with recent ischemic stroke for OSA [8,9]. This has led to additional confusion over whether testing is important.

Devin et al.'s article [10], "Sleep apnea screening is uncommon after stroke" in this journal highlights the low rates of screening and testing for OSA in stroke patients. They found only 17% of patients were offered sleep apnea testing prior to their stroke and 6% offered testing after the stroke. Additionally, most patients were not asked about snoring (5%) or sleepiness (9%) after their stroke. They found no increase in screening after the 2014 guidelines. Other studies have shown that typical OSA symptoms are only present in approximately 70% of patients with severe OSA and 32% of patients with mild-moderate OSA, suggesting that while screening with simple questions may miss a large proportion of patients, they are much better than nothing [11]. Furthermore, other tools have been evaluated in the stroke population that may improve screening.

Standard workup after strokes and TIAs involves testing to determine stroke etiology and determining optimal risk factor management. Many of the modifiable risk factors that are commonly tested for have similar or lower adjusted relative risk of stroke than OSA (Table 1). So why is evaluating for the presence and severity of a highly prevalent treatable disorder so controversial?

Is it because providers think the testing is too expensive? While AASM guidelines still recommend in-laboratory polysomnography for patients with stroke, many studies have demonstrated the adequacy of home sleep apnea testing (HSAT) in most patients, which can either be done at home or while patients are still in the hospital [12,13].

Is it because providers think patients won't use CPAP? While adherence rates are still suboptimal, they have been improving in recent years with technological and mask improvements and rates are comparable to medication adherence. Moreover, CPAP is not the only available therapy, with other options including mandibular advancement devices, and surgery including hypoglossal stimulators. Behavioral recommendations including sleeping in nonsupine position, weight loss, alcohol, and smoking cessation can also have an important impact.

Is it because providers think that treatment of OSA has no effect on stroke prevention? Physiological studies have shown the positive effects of CPAP on stroke mechanisms such as endothelial inflammation, reducing hypertension and sympathetic activation and arrhythmias, and improving cerebral blood flow regulation and hypercoagulability [14,15]. Several unrandomized studies suggest that CPAP may prevent recurrent strokes and other adverse cardiovascular outcomes [16] and a small randomized trial showed a trend toward improved event free survival [17]. The larger randomized SAVE trial did not show overall decrease in cardio- or cerebro-vascular events in patients who were randomized to CPAP, but the average use of CPAP was only 3.3 hours [18]. However, they found that patients who were adherent to CPAP had lower risk of stroke compared to usual-care group [HR 0.56 (0.32–1.00)] and lower risk of cerebral events [HR 0.52 (0.30–0.90)]. Since it is possible that patients who are adherent with CPAP are also more adherent to other therapies, the effect of CPAP remains unclear. The failure of this trial demonstrates the difficulties of performing large randomized trials with CPAP, which can be limited by factors including phenotypical heterogeneity in the severity of underlying OSA when defined by apnea hypopnea index, the variable hours of CPAP use and the variable treatment effect if CPAP is not appropriately optimized (ie, residual apnea/hypopnea index or time of oxygen saturation < 90%) [19]. It is possible there may never be a definitive randomized trial. Additionally, OSA likely causes damage to cardio- and cerebro-vascular systems over many years; therefore, short-term CPAP treatment may not quickly reverse endothelial and other damage. Primary prevention of strokes with OSA treatment may be most beneficial and long-term studies may be needed to demonstrate the full effect of treatment.

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Table 1
Modifiable stroke risk factors.

Risk factor	Adjusted relative risk for stroke
Hypertension	1.4 (age 80) 4.0 (age 50)
Smoking	1.8
Diabetes	1.8–6
Atrial fibrillation	2.6–4.5
High cholesterol	2.0
Lupus anticoagulant	1.8
Carotid stenosis	2.0 for asymptomatic
PFO	0.95–1.83
PFO + Atrial Septal Aneurysm	2.98–4.96 (yearly stroke risk of 4%)
Obstructive Sleep Apnea (AHI > 5)	2.24 (95% CI 1.57–3.19)

AHI: apnea hypopnea index; Adapted from Goldstein et al., [20,21].

While more research is needed, the available evidence supports recommendations to evaluate OSA signs and symptoms in all stroke patients, and to test at least higher risk patients or those with cryptogenic strokes. OSA should be treated like other known stroke risk factors.

Conflict of interest

The authors have indicated they have no potential conflicts of interest to disclose.

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: https://doi.org/10.1016/j.sleep.2018.10.016.

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