Stroke and Sleep Specialists: An Opportunity to Intervene?


Nathaniel F. Watson, M.D., M.S.
University of Washington (UW), Department of Neurology and UW Medicine Sleep Institute, Seattle, WA

As the leading cause of long-term disability and the third leading cause of death, the public health devastation of stroke has been well described. But the true impact of this disorder cannot be conveyed by statistics. Stroke robs patients of their ability to communicate, think clearly, see, move, and feel and inasmuch destroys the very essence of the individual. Primary and secondary stroke prevention focus on risk-factor mitigation. When prevention fails, acute stroke therapy involves damage control and rehabilitation. So where does the diagnosis and management of sleep disordered breathing (SDB) fit into this paradigm?

In this issue of the Journal, Johnson and Johnson move us closer to an understanding of the association between SDB and stroke. They performed a meta-analysis of 29 studies and found that 72% of stroke patients had SDB, as defined by an apnea-hypopnea index greater than 5. Subgroup analysis found, among other things, that stroke etiology, male sex, and initial versus recurrent stroke influence disease prevalence, whereas event type and stroke location do not. These intriguing findings raise as many questions as they answer and suggest an opportunity for the sleep community to influence stroke incidence and outcomes.

A central question of the stroke-SDB relationship has always been, which came first? Both disorders share many risk factors, including male sex, age, obesity, smoking, and alcohol use. Further complicating matters is that SDB influences a number of other more prominent stroke risk factors including hypertension, diabetes mellitus, carotid disease, atrial fibrillation, and cardiac disease. Disentangling these relationships to define the true nature of the association between these disorders has been challenging. The work by Johnson and Johnson helps in this regard. If the driving force behind this association were that stroke caused the SDB, stroke type, location, and duration of time from the event would be expected to change according to AHI, but this was not the case. An alternative interpretation is that, for the most part, SDB precedes the stroke, and not vice versa.

Johnson and Johnson found that patients with stroke of unknown cause or “cryptogenic stroke” had the highest incidence of SDB, raising the specter that SDB influences stroke beyond its association with traditional stroke risk factors. Paradoxical embolism through a patent foramen ovale, increased platelet activation, and apnea-induced reductions in cerebral blood flow and oxygen saturation may explain the finding for cryptogenic stroke. With this in mind, is SDB an independent risk factor for stroke? Biologic plausibility and consistency across studies are present. Numerous studies demonstrate the association, even when controlling for factors (eg, hypertension, diabetes) likely in the pathway of interest. However, we lack prospective cohort data and clear evidence that SDB treatment influences stroke incidence. Currently there are 13 clinical trials focusing on the relationship between SDB and stroke, with 5 focused on treatment, including 1 assessing SDB treatment as primary prevention of stroke. Establishing SDB as an independent risk factor for stroke awaits the results from these studies. Regardless, Johnson and Johnson provide compelling evidence that the sleep community should seek out a more active role in the diagnosis of SDB and management of these patients.

The high prevalence of SDB in stroke supports the claim by Johnson and Johnson that all stroke patients should be screened for SDB. This conclusion seems reasonable given the numbers, but other factors should be considered. Johnson and Johnson demonstrate that apnea-hypopnea index was associated with recurrent stroke, suggesting a role for the diagnosis and treatment of SDB in secondary prevention of stroke. Furthermore, SDB can increase hospital length of stay and mortality following stroke, suggesting an opportunity to improve outcomes with SDB treatment. However, continuous positive airway pressure (CPAP) compliance in stroke patients is notoriously poor, and current evidence that treatment of SDB improves stroke outcomes is inconsistent. As a result, further outcomes research is needed before universal screening or treatment can be recommended. Also in question is what the screening should entail. Johnson and Johnson found that more than 25% of patients with SDB did not snore, whereas more than 50% of patients without SDB did, suggesting that questionnaire-based screening may not be adequate. For the time being, given these concerns about SDB, advocating for the institution of simple interventions after stroke seems reasonable, such as raising the head of bed, avoiding the supine position, keeping nasal passages clear, and administering oxygen for low saturations.

Caution is needed in universally applying treatments such as CPAP because stroke type may well influence the effectiveness of such treatments on outcomes. Patients with ischemic stroke have an area of the brain adjacent to the core infarct known as the ischemic penumbra, representing salvageable at-risk brain...
tissue. Cerebral blood flow autoregulation is typically compromised in the acute stroke setting, making cerebral perfusion pressure dependent on mean arterial pressure (MAP). For this reason, blood pressures are allowed to run high following stroke to ensure perfusion of the ischemic penumbra. The impact of CPAP in the acute ischemic stroke setting, with potential reductions in MAP, may do more harm than good.

Conversely, hemorrhagic stroke, often due to uncontrolled hypertension, may benefit from reductions in MAP brought about by CPAP, suggesting that treatment in the acute setting may be beneficial. Therefore, future studies need to consider stroke type as well as the timing of CPAP application when researching the effectiveness of SDB treatment on stroke outcomes.

Although much is left to be done, Johnson and Johnson are to be congratulated for bringing these issues into clearer focus with this important meta-analysis. Future studies should concentrate on whether treatment of SDB influences the subsequent risk of incident stroke. Particular attention should be paid to cryptogenic stroke, as SDB prevalence was highest in this stroke-etiologic category. Greater emphasis should be placed on the impact of stroke severity and neuroanatomic location of the stroke on SDB prevalence, as this may guide clinical diagnostic decision making. As we wait for further studies of SDB treatment on stroke outcomes, implementing common-sense simple strategies in stroke units seems prudent to lessen the impact of SDB on stroke. The scope of the problem has been well defined by Johnson and Johnson; the onus is now on the sleep community to reach out to our neurology colleagues to help them prevent and treat this devastating illness.

REFERENCES


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Address correspondence to: Nathaniel F. Watson, M.D., M.S., University of Washington (UW), Department of Neurology and UW Medicine Sleep Institute, Harborview Medical Center, 325 Ninth Ave., Box # 359803, Seattle, WA 98104-2499; Tel: (206) 774-4337; Fax: (206) 774-5657; E-mail: nwatson@uw.edu

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