To the Editor:

In recent months 2 research reports1,2 in the Journal have contributed important data and analysis regarding the ineffectiveness of respiratory therapy and other mechanical ventilatory assistance in most patients with respiratory sleep disorders and/or heart failure, compared with guideline-directed medical therapy alone. These reports provided important corroboration of data reported by other investigators in other parts of the world3 that these therapies are unhelpful in reducing life-threatening cardiac events and mortality except in a few small subpopulations.

Several experts4,5 have explored the data provided by these1,3 and other similar recent clinical trials regarding this patient population – they have acknowledged their overall surprise at the results – and they have searched for a new direction in patient management.

The reasons for conducting these various trials1–3 in the first place were stated in the introduction of one of the reports:1 “Sleep-disordered breathing (SDB) is frequently observed in patients with chronic heart failure (CHF), with a prevalence of up to 70% [reference]. It has been reported that SDB adversely affects cardiovascular functions due to the overnight hypoxia and sympathetic nervous system activation, which can worsen prognosis in patients with CHF [reference]. Previous studies reported that both obstructive sleep apnea (OSA) and central sleep apnea (CSA) increase the frequency of ventricular premature beats, a surrogate marker of ventricular irritability [references]. Also, several reports found that OSA and CSA are associated with impaired cardiac autonomic function and increased cardiac arrhythmias, and that treatment of SDB reduces sympathetic nervous activity [references].” And finally, as stated in the title of another earlier research report in the Journal,6 “Sleep-disordered breathing increases risk for fatal ventricular arrhythmias in patients with chronic heart failure.”

This problem list expresses the importance of the efferent ‘fight or flight’ sympathetic nervous system influence on the heart – which is complex and poorly understood in the setting of illness as opposed to health. But the problem list does not include the flip side of that efferent sympathetic activity, which is the voluminous afferent ‘return-messaging’ from the heart, lungs, and arteries via sensory visceral autonomic fibers back to the brain’s ‘central receiving station’ for such messaging – the solitary tract nuclei of the medulla oblongata.

This return-messaging can be characterized as excitatory – and sometimes so much so that some investigators believe that the process of receiving the feedback can itself actually damage the solitary tract nuclei.7,8 The excitatory return-messaging is believed to significantly increase the metabolic rate of parenchymal tissue in dendritic areas of the solitary tract nuclei, where much of that parenchyma is perfused by only a limited watershed vasculature. The result is focal areas of ischemia and occasionally infarction.7,8

These medullary ischemic lesions often then cause further problems by triggering violent autonomic discharges, which are life-threatening.9 The specific mechanisms are unknown.9 Ischemic lesion formation in the solitary tract nuclei of patients with central sleep apnea and/or heart failure disrupts medullary brain autonomic regulation, and may induce severe cardiac arrhythmias.7,9

The failure of the various recent clinical trials1–3 to prevent life-threatening cardiac events possibly lies in their failure to address the focal physiological mismatch causing medullary brain ischemia.7,9 The improvement in nocturnal systemic blood gasses probably has little overall effect on this focal physiological mismatch, which is often localized primarily to the solitary tract nuclei.

References


J. Howard Jaster, MD
Department of Medicine,
London Corporation,
Memphis, TN, USA
(Released online March 4, 2016)