

## Are We Failing Our Heart Failure Patients?

### Abstract & Commentary

**Synopsis:** Adding continuous positive airway pressure (CPAP) to medical therapy in patients who have obstructive sleep apnea and congestive heart failure both improves systolic function and lowers blood pressure.

**Source:** Kaneko Y, et al. *N Engl J Med.* 2003;348: 1233-1241.

This was a controlled study of 24 patients who had heart failure and obstructive sleep apnea (OSA). Inclusion criteria included a history of ischemic or nonischemic dilated cardiac myopathy (a.k.a. heart failure), left ventricular ejection fraction less than 45%, New York Heart Association (NYHA) functional class II to IV, optimal treatment with medications, and obstructive sleep apnea. In this study, obstructive sleep apnea was defined as an apnea plus hypopnea index (AHI) of at least 20 events per hour of sleep. Patients with primary valvular heart disease, pacemakers, unstable angina, and recent (within 3 months) myocardial infarction or cardiac surgery were excluded. All patients had sleep studies and cardiac evaluations including digital photoplethysmography and 2-dimensional echocardiography at baseline and after 1 month. Those randomized to receive CPAP underwent a second night of sleep testing (after the first diagnostic test) to establish optimum CPAP pressure.

All of the subjects were habitual snorers, and most were middle-aged obese men (21/24 men, mean age about 55 years). These people were not particularly sleepy, as evidenced by normal Epworth Sleepiness Scores. Treatment and control groups were not different in baseline measures. Those who received CPAP required an average of  $8.9 \pm 0.7$  cm H<sub>2</sub>O pressure.

After 1 month, the control group had not changed in any of the reported measures, but the 12 patients who were treated with CPAP had significant improvements in measures of sleep-disordered breathing and in nocturnal oxygen saturation. More importantly, they also had significant improvements in daytime systolic blood pressure (from  $126 \pm 6$  to  $116 \pm 5$  mm Hg;  $P = 0.02$ ), in heart rate (from  $68 \pm 3$  to  $64 \pm 3$  beats per minute;  $P = 0.007$ ), in left ventricular ejection fraction (from  $25.0 \pm 2.8\%$  to  $33.8 \pm 2.4\%$ ;  $P < 0.001$ ), and a 35% increase in left ventricular end-diastolic and end-systolic volumes ( $P = 0.009$ ). All of these changes were significant compared with the control group. Improvements were similar both in those who were and those who were not taking beta-blockers, and in those with ischemic and nonischemic cardiomyopathy.

### Comment by Barbara A. Phillips, MD, MSPH

Wow! A nonpharmacologic treatment for congestive heart failure that is cheap and has minimal side effects! Heart failure is a prevalent and expensive condition with high morbidity and mortality. Patients with heart failure have high rates of both obstructive and central sleep apnea; it is likely that obstructive sleep apnea is the cause of the heart failure, and central sleep apnea is the result.<sup>1,2</sup> No matter; CPAP is a highly effective treatment for both!<sup>3,4</sup>

This is the first controlled study to demonstrate that nocturnal CPAP significantly improves the daytime cardiac function of optimally treated heart failure patients. It also demonstrates a dramatic (10 mm Hg) fall in daytime systolic blood pressure and heart rate, suggesting that reduced afterload is one likely mechanism of its beneficial effect.

It is notable that these patients were not very sleepy; no one had an Epworth Sleepiness Score of more than 10, which is felt to be the cut-off range for normal. Yet they wore CPAP anyway and benefited significantly. In addition to improving cardiac function and sleepiness, CPAP can lower

blood pressure,<sup>5</sup> improve daytime cognition,<sup>6</sup> reduce car wrecks,<sup>7</sup> improve quality of life,<sup>8</sup> and reduce health care costs.<sup>9</sup> Yet, the vast majority of patients with obstructive sleep apnea are probably not being treated.<sup>10</sup> There are many barriers to treatment of sleep apnea, including limited access to sleep testing, the requirement to spend 1 or 2 nights in the sleep laboratory, third-party payers, and lack of awareness both by patients and by physicians.

With the growing body of evidence that sleep apnea causes significant cardiovascular morbidity and mortality and that treatment with CPAP can reduce this health burden, it is becoming increasingly difficult to justify the delays and cost of our current approach to sleep apnea diagnosis. This is especially true since many of those with sleep apnea can be diagnosed with simple clinical tools such as a history, physical examination and/or questionnaires!<sup>11-18</sup> As awareness grows, it is likely that careful clinical evaluation, home monitoring and auto-titrating (or "smart") CPAP will improve access and patient convenience. In the meantime, we owe it to our patients to look for this very treatable condition.

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