Continuous Positive Airway Pressure in Patients With Congestive Heart Failure and Cheyne-Stokes Respiration With Central Sleep Apnea

To the Editor:

The article by Sin et al1 on the effect and outcome of continuous positive airway pressure (CPAP) in patients with congestive heart failure (CHF) who have Cheyne-Stokes respiration with central sleep apnea (CSR-CSA) is one more step toward further defining the role of treatment for sleep-disordered breathing in CHF. The authors conclude that CPAP improves short-term left ventricular ejection fraction (LVEF) and may improve mortality and transplant-free survival in patients with CSR-CSA but not in patients without it. A few features of the study merit further observation.

The authors demonstrated a statistically significant improvement in LVEF at 3 months, but they did not establish that the initial benefit was sustained. Repeat measurements of LVEF at 18 months (the mean long-term follow-up period) would have been useful. This would further corroborate the observed trend toward improved mortality and transplant-free survival. In this study, all the patients with CSR-CSA who were compliant with CPAP benefited in terms of the above outcomes. It is not clear that the CPAP level used completely eliminated sleep-disordered breathing events; in another recent study,2 CSA was only corrected in 43% of the patients with CPAP.

In addition, the group of patients with CSR-CSA who benefited from CPAP included a greater number of patients with ischemic cardiomyopathy. Pathophysiologically, CPAP improves preload and afterload and may have a beneficial effect on the episodes of nocturnal ischemia related to disordered breathing events and desaturations. The benefits of CPAP in a hibernating myocardium may extend to prevent deterioration and, possibly, improve cardiac function and influence cardiovascular outcomes. This might explain why the benefits of CPAP in these patients are greater than those in patients with dilated cardiomyopathy from other causes.

Other important end points were not evaluated: did CPAP-treated patients have fewer exacerbations or hospital admissions for CHF and did exercise capacity subjectively improve? LVEF does not always correlate with exercise capacity, and perhaps the effects of CPAP on exercise capacity outweigh objective improvements in LVEF. Quality-of-life issues and CPAP compliance are important issues that also need to be addressed because in these patients, the duration of therapy is indefinite and possibly lifelong.

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Response

Mehta and Groth raise several important points about our study. Because there was only a single reassessment of left ventricular ejection fraction (LVEF) 3 months into the trial, we could not evaluate whether improvements in LVEF were sustained beyond this period. However, we are presently conducting a long-term, multicenter, randomized trial of continuous positive airway pressure (CPAP) in patients with congestive heart failure (CHF) and Cheyne-Stokes respiration with central sleep apnea (CSR-CSA), the Canadian Positive Airway Pressure for Heart Failure (CANPAP) trial, with cardiac transplant-free survival as the primary outcome.1 Serial measurements of LVEF will be made throughout the 5-year duration of the trial. This will allow us to determine whether early improvements in LVEF are sustained and related to the primary outcome.

Although we did not measure the effects of CPAP on the severity of CSR-CSA in our latest trial, we have done so previously. Naughton et al2 demonstrated a 65% reduction in the frequency of central apneas and hypopneas (from 43 to 15 per hour) after 1 month of outpatient CPAP. CPAP is generally not effective in alleviating CSR-CSA during a single night; it requires several days to weeks for this beneficial effect to accrue.

A total of 83% of the patients with CSR-CSA had ischemic cardiomyopathy. Therefore, we agree that CPAP-induced reductions in preload and afterload,2 the elimination of apnea-related hypoxia, and decreases in sympathetic nervous system activity3 could have reduced episodes of nocturnal ischemia in such patients. However, this does not preclude a beneficial effect of CPAP in patients with nonischemic dilated cardiomyopathy.

Although the number of patients in our trial was too small for subgroup analysis, among patients with CSR-CSA, the beneficial effects of CPAP on LVEF were similar in those with ischemic and nonischemic cardiomyopathy. Moreover, in our analysis of transplant-free survival, we controlled for underlying cause of CHF. Therefore, the more pronounced beneficial effect of CPAP on LVEF and transplant-free survival in the CSR-CSA group than in the non-CSA-C group is not likely to be accounted for by the higher proportion of patients with ischemic cardiomyopathy in the former group.

Although not evaluated in the present study, we demonstrated in a previous trial that hospital admissions were greatly reduced and quality-of-life and subjective exercise capacity improved in the CPAP-treated group.2 With respect to CPAP compliance, please note that patients randomized to CPAP used it 6 hours per night during the first 3 months of the trial.1 We agree, however, that it would be important to assess hospital admissions, quality-of-life, and CPAP compliance over longer periods because CPAP may be lifelong therapy. Indeed, these factors will be assessed over the entire 5-year duration of the CANPAP trial.

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