Can CPAP prevent myocardial damage?

Continuous Positive Airway Pressure has been pointed as gold standard treatment for obstructive sleep apnea (OSA) since 1980s. Several beneficial effects have been reported, in particular with regard to sleepiness, apnea hypopnea index or nocturnal hypoxemia (1). However, the cardiovascular consequences of OSA have been better explored in the last decade. Perhaps the most important mechanisms contributing to myocardial damage are: endothelial dysfunction, increased sympathetic activity, inflammation and metabolic anomalies (2). As a result left ventricle (LV) and right ventricle (RV) dysfunction have been reported in patients with moderate to severe OSA (2, 3). With regard to cardiac function, several studies addressed the effects of CPAP in heart failure patients. Jardin F et al. (4) in 1984 evaluated the acute effect of CPAP using M-mode ecocardiographic evaluation, and found a marked decrease in left and an increase in right ventricular dimensions during both expiration and inspiration and a significant decrease in calculated stroke output. However, the long-term effect of CPAP treatment on cardiac function and structure may be beneficial, but clinical trials, randomized studies including significant number of patients and significant follow up period are scant. In this context, the study of Bilge et al. (5) in this issue published in the Anatolian Journal of Cardiology adds to the literature because the authors evaluated the cardiac function of OSA patients after 5-year of CPAP effective treatment. Butt et al. (6) found a reduction of the posterior wall thickness, improvement in LV ejection fraction (EF), systolic S velocity, and diastolic LV parameters after a mean of 26 weeks of CPAP treatment. Grandi et al. (7) evaluated overweight and obese patients. They also performed echocardiographic evaluation before and after 18 months of CPAP treatment, and found LV remodeling is not associated with OSA per se, but it was mainly linked with body weight decrease (7). Colish et al. (8) using both echocardiogram and cardiac MRI found that systolic and diastolic abnormalities improved with 3 months of CPAP, but cardiac remodeling improved after one year of treatment, reinforcing the importance of long term studies for the evaluation of cardiac functional and structural parameters in OSA patients. In summary some studies have shown differential improvement in LV and RV function after 6 months of CPAP treatment in OSA patients without heart failure (3, 9-11). The studies of our group reinforced the improvement in LV and RV function after 6 months of CPAP, especially in those patients with severe OSA who showed higher frequency of LV and RV impairment (3, 11). Strengths of Bilge et al. (5) study are related to the design: a) prospective cohort study; b) compliance to treatment of at least 5 hours daily; c) long term follow up of 5 years; d) exclusion of uncontrolled high blood pressure. The authors were also careful when reporting LV and RV variables using echocardiography and Doppler techniques. However, they ended up with 21 patients which mean nearly half initial number, which may be in agreement with other studies showing similar rate of CPAP compliance. Their patients did not show significant impairment on echocardiographic and tissue Doppler parameters at baseline, but, still, the authors were able to show improvement in the classical Doppler parameters. However, the only tissue Doppler parameter that differed significantly after 5-year CPAP treatment was the early diastolic myocardial peak velocity/ Late diastolic myocardial peak velocity (Em/Am) ratio. Finally the authors concluded that echocardiographic monitoring with Doppler may be useful to monitor CPAP efficacy. To fully respond to the question of “Can CPAP prevent myocardial damage, independently of hypertension” is still a matter of discussion, and future larger controlled and randomized trials are still needed.

References


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