Severe Obstructive Sleep Apnea Increases Left Atrial Volume Independent of Left Ventricular Diastolic Impairment

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Previous studies have demonstrated that severe sleep apnea (OSA) itself impairs directly left ventricular (LV) diastolic function, and left atrial volume index (LAVI), which is an independent predictor of future cardiovascular events, is also related to the OSA severity. The purpose of this study was to investigate whether OSA is associated with increase of LAVI independently of LV diastolic function.

Methods. This study included 206 OSA {apnea hypopnea index (AHI) ≥ 5/h} patients without cardiac disease, hypertension or diabetes. All the patients underwent overnight fully attended polysomnography, and 2-dimensional echocardiography and tissue Doppler imaging (TDI) in order to estimate left atrial (LA) volume and LV diastolic function which was assessed by the transmitral flow velocity (E/A ratio), deceleration time (DCT), systolic/diastolic pulmonary vein velocity (S/D), and mitral annular velocity (e'). Patients were divided into the following 2 groups; the mild to moderate OSA (AHI < 30/h) group and the severe OSA (AHI ≥ 30/h) group. We compared LAVI and LV diastolic function between the groups. Multivariate analysis performed whether severe OSA was the independent factor of LAVI independently from LV diastolic dysfunction.

Results. The LAVI in the severe OSA group was significantly larger than that in the mild to moderate OSA group (23 ± 5 vs. 20 ± 5 ml/m², P < 0.0001). E/A ratio in the severe OSA group was significantly lower than that in the mild to moderate OSA group (P < 0.0001), whereas S/D ratio and E/e' in the severe OSA group were significantly higher than those in the mild to moderate OSA group (P < 0.001, respectively). The AHI showed a statistically significant correlation with the LAVI (r = 0.29, P < 0.0001), and inverse correlations with E/A ratio (r = 0.35, P < 0.0001). Multivariate linear regression analysis revealed that severe OSA was independently related with LAVI even after adjusting for age, sex, systolic and diastolic blood pressure, body mass index, and LV diastolic function (β = 0.124, P = 0.04).

Conclusions. These results suggest that severe OSA itself increases directly LA volume independent of LV diastolic function.