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Atrial Electromechanical Delay, Apical 4-Chamber Longitudinal Strain and Echocardiographic Changes in Patients with Obstructive Sleep Apnea

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Objectives: The aim of this study was to evaluate atrial electromechanical delay, apical 4-chamber longitudinal strain and echocardiographic changes in patients with obstructive sleep apnea (OSA). We especially focused on atrial electromechanical delay, longitudinal strain, and diastolic-systolic functions of right-left heart in these patients.

Methods: The patient group consisted of 46 patients (32 male, 14 female) who were referred to the Sleep Disorders Center of Caucasian University Hospital and were diagnosed as mild-to-severe OSA (AHI \geq 5 events/h) on polysomnographic evaluation. The control group consisted of 35 healthy subjects (18 male, 17 female) who were found not to have OSA (AHI <5 events/h) on polysomnographic evaluation. The following parameters of all patients were evaluated: age, gender, body mass index (BMI), comorbidity, blood glucose, electrolytes, liver function tests, renal function tests, complete blood count, trans-thoracic echocardiography and polysomnography.

Results: The two groups were similar regarding age and sex. BMI and number of patients with hypertension were higher in the OSA group ($p < 0.001$). Glucose levels, urea, creatinine, uric acid, AST and ALT were higher significantly in the OSA group. Hemoglobin, hematocrit, eosinophile count, and percent were significantly higher in the OSA group. Left ventricle end-diastolic diameter, end-systolic diameter, interventricular septum and posterior wall thickness were significantly higher in the OSA group ($p < 0.005$). LV ejection fraction and Ea/Aa mitral ratio were lower in the OSA group. Right ventricle basal, mid and vertical diameters, Emax, Amax, and Ea tricuspid, tricuspid regurgitan velocity, systolic pulmonary artery pressure, and systolic motion tricuspid were significantly higher in the OSA group. TAPSE was significantly lower in the OSA group compared to healthy subjects ($p < 0.001$). Atrial electromechanical delay lateral/tricuspid, lateral/mitral and septal were significantly higher in the OSA group ($p < 0.001$). Mid anterolateral, apicolateral, apex, apical septal and 4C-LS (four chamber longitudinal strain) were differed significantly for two groups ($p < 0.001$).

Conclusion: In conclusion, we found OSA may cause impairment of right-left ventricle systolic and diastolic functions. In this study, the most important finding is that OSA effects atrial electromechanical delay and longitudinal strain.

Keywords: Obstructive sleep apnea, echocardiography, atrial electromechanical delay, longitudinal strain