Introduction: Atrial remodeling associated with atrial fibrillation (AF) and sleep apnea is well known. The study aim was to evaluate sleep apnea, atrial volume, and low-voltage zones for mapping in AF patients and to investigate the effect of sleep apnea on right atrial (RA) and left atrial (LA) remodeling.

Methods: We enrolled 139 AF patients who had undergone ablation. Sleep study results were evaluated; RA and LA volumes were determined by computed tomography, and the bi-atrial substrate was evaluated by electroanatomical mapping.

Result: Finally, 111 patients were analyzed. The patients were classified into four groups according to the presence of RA and/or LA structural remodeling: 61 no dilatation, 9 LA dilatation, 21 RA dilatation and 29 bi-atrial dilatation with no significant differences in terms of age, BMI, the type of AF. Significant differences in N-terminal pro B-type natriuretic peptide (NT-proBNP) levels and apnea–hypopnea index (AHI) were observed among the four groups. In univariate analysis, AHI values correlated with NT-proBNP levels (P = 0.002), left ventricular ejection fraction (LVEF) (P = 0.044), LA volume (P < 0.001), and RA volume (P < 0.001). AHI levels correlated with RA volume regardless of AF type. Multiple regression analysis showed that AHI was an independent predictor of increased RA volume, and LVEF and NT-proBNP were independent predictors of increased LA volume, respectively.

Conclusion: RA structural remodeling was strongly associated with sleep apnea regardless of paroxysmal and persistent AF. In recent years, there are reports that RA structural remodeling causes recurrence after AF ablation, it is necessary to pay attention about the association between sleep apnea and RA dilatation.