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Right atrial low voltage zone as a novel predictor of sinus node dysfunction in patients with non-paroxysmal atrial fibrillation

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Background: Although sinus node dysfunction (SND) coexists with atrial fibrillation (AF) in some cases, SND in patients with Non-paroxysmal AF (Non-PAF) could not be estimated in conventional electrophysiological study.

Atrial low voltage zone (LVZ), which may be surrogate for atrial fibrosis, is although reported to present in patients with Non-PAF, the association between SND and right atrial LVZ (RA-LVZ) has not been fully evaluated. The aim of the present study was to assess the relationship between SND and RA-LVZ in patients with Non-PAF.

Method: Eighty-six Non-PAF patients underwent high density voltage mapping of right atrium (RA) during AF before ablation procedure. We defined LVZ as that with electrogram amplitude <0.1 mV in order to delineate strongly damaged area in RA. We evaluated the surface area of the RA-LVZ in Non-PAF patients with and without SND.

Results: Twenty-seven of 86 patients (31.4%) presented with SND after AF termination. There were no significant differences between patients with and without SND in variables such as age, sex, AF duration, left atrial di-

ameter, and left ventricular ejection fraction. The mean value of RA-LVZ of all the patients was $12.1 \pm 11.4\%$, and RA-LVZ was significantly larger in patients with SND than in those without SND (22.8 ± 14.6 vs $7.2 \pm 4.2\%$; $P < 0.001$). In multivariate logistic regression analysis for the incidence of subsequent pacemaker implantation (PMI), only RA-LVZ was a significant predictor of subsequent PMI (odds ratio 1.306; 95% confidence interval 1.159 - 1.473; $P < 0.001$). Receiving-operating characteristic curve for PMI following ablation procedure indicated cut-off value 10.5% for RA-LVZ with 85.2% sensitivity and 88.1% specificity (area under curve = 0.924, $P < 0.001$). Kaplan-Meier analysis of the incidence of PMI after AF termination showed that freedom from pacemaker implantation was significantly better in patients with RA-LVZ $<10.5\%$ than in those with RA-LVZ $\geq 10.5\%$ (log-rank test; $P < 0.001$).

Conclusions: Broad RA-LVZ measured during AF was strongly associated with SND and PMI after AF termination in patients with Non-PAF. Evaluation of RA-LVZ during AF could be a potential target in predicting SND requiring PMI in patients with Non-PAF.