Pre-ablation left atrial function predicts the presence of low voltage zone in patients undergoing paroxysmal atrial fibrillation ablation: OLAF-LVZ predictive score

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Background: Preoperative left atrial (LA) function is associated with paroxysmal atrial fibrillation (PAF) ablation outcome. The presence of left atrial low voltage zone (LVZ) is also associated with recurrence. We hypothesized that reduced pre-ablation LA function reflects the presence of LVZ.
Purpose: We investigated the association between baseline LA function and the presence of LVZ in patients undergoing initial PAF ablation. Further, we sought to create the new predictive scoring for the presence of LVZ.
Methods: Consecutive 305 patients who underwent LA voltage mapping during initial PAF ablation from January 2017 to October 2019 in our institute were retrospectively analyzed. We performed 256-slice MDCT at baseline. As the representative of LA function, we calculated LA emptying fraction (LAEF), where LAEF = {[(maximum LAV) – (minimum LAV)]/(maximum LAV)} x 100. LVZ was defined as regions where bipolar peak-to-peak voltage was <0.5mV. We performed the univariate and multivariate analysis to assess the association between LAEF and the presence of LVZ. Second, we performed receiver operating characteristic (ROC) analysis for the prediction of LVZ. We combined multivariate predictors and created the predictive scoring for LVZ.
Results: Out of 305 pts, 56 pts (18%) had LVZ in LA. In univariate anal-

ysis, low body mass index, higher percentage of female sex, higher age, higher E/e', larger maximum LA volume and lower LAEF (29.3±11.8% vs. 41.2±9.7, P<0.0001) was associated with the presence of LVZ. In multivariate logistic regression analysis, Low LAEF revealed the strongest predictor for LVZ (LAEF; Odds ratio [OR]/10% increase: 0.54, 95% CI: 0.39–0.82, P=0.0016). High age and female sex also remained as the independent predictors (Age; OR/10 y.o. increase: 1.80, 1.23–3.03, P=0.0042, Female; OR: 2.51, 1.15–5.49, P=0.0213). In ROC analysis, LAEF had moderate predictive accuracy for the presence of LVZ. (Area under the ROC curve: 0.77, Best cut-off value: 31%, P<0.0001) (Figure 1). We created OLAF-LVZ predictive score by combining Old age (1 point, ≥65), LAEF (2 points, LAEF ≤31%) and Female sex (1 point). OLAF score had gradient effect on the incidence of LVZ (2%, 11%, 25%, 45%, 71%, OLAF score; 0, 1, 2, 3, 4, respectively, P<0.0001) (Figure 2).
Conclusions: In PAF patients, preoperative LAEF was strongly associated with the presence of LVZ. LVZ might reflect the myocardial injury causing LA dysfunction. OLAF-LVZ predictive score: combination of Old age (≥65), Female sex, and LAEF (≤31%) could be useful to stratify the risk of the presence of LVZ.

Figure 1

Predictive power of LAEF for the presence of LVZ

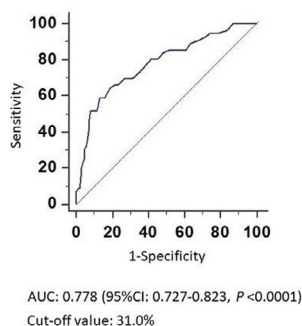AUC: 0.778 (95%CI: 0.727-0.823, P<0.0001)
Cut-off value: 31.0%

Figure 2

OLAF-LVZ predictive score
Old age (≥65 y.o.): +1
LAEF ≤31% : +2
Female sex: +1

P <0.0001