Left Atrial Conduction Time by 3D-Echocardiography in Patients with Atrial Fibrillation is a Novel predictor of Recurrence after Catheter Ablation

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Introduction: It has been reported that the left atrial (LA) volume, scar or low voltage area in LA, LA conduction time (LACT) and p wave duration represent LA remodeling. Furthermore, the relationship between these parameters and atrial fibrillation (AF) development or recurrence after catheter ablation (CA) has been reported. 3D electro-anatomical mapping system can measure electrical-LACT directly. However, we could not know this information before CA procedure because of the invasive nature. Therefore, noninvasive activation imaging by 3D echocardiography (3DE) might be clinically useful in assessing LACT instead of 3D electro-anatomical mapping system. The aim of this study is to validate reliability of the 3DE derived LACT by comparing with previously reported parameters. Furthermore, the reliability of the mechanical-LACT obtained by 3DE to predict AF recurrence after CA was evaluated.

Methods: This study included 27 AF patients who underwent CA (paroxysmal/persist=19/8). 3DE activation imaging by an Artida system (Toshiba) and activation mapping by a CARTO system (Biosense Webster) were obtained. All image data sets were obtained under sinus rhythm before CA. LACT was defined as a time from onset to end of activation on each entire LA image.

Result: The mechanical-LACT significantly correlated with the electrical-LACT (r=0.68, p<0.001) (Figure A), LA volume index (r=0.39, p<0.05) and P-wave duration (r=0.56, p<0.05). During 12 months follow up period after CA, AF recurrence was observed in 6 patients (22%). The mechanical-LACT was significantly greater in the patients with recurrence than in those without recurrence (94±27ms vs. 65±32ms, p<0.05). The mechanical-LACT with cutoff value of 80ms was significantly related to AF recurrence (sensitivity 80%, specificity 76%, p<0.05) (Figure B).

Conclusion: 3DE activation imaging may be a noninvasive reliable method to estimate mechanical-
LACT, which could be a novel factor to predict AF recurrence after CA.