Echocardiographic prediction of atrial fibrillation recurrence shortly after catheter ablation

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Background/Aims: Catheter ablation has been frequently performed as a treatment for atrial fibrillation (AF), and AF recurrence after ablation is an issue of concern. Prediction of AF recurrence after ablation could influence decision making for treatment strategies and prognosis. The purpose of this study is to find out the predictors of AF recurrence, including the echocardiographic parameters at day 1 after ablation.

Methods: Among 310 patients with AF who underwent ablation, 196 patients (58 ± 8 years; 73.5% men; 56.1% persistent AF) with normal range of ejection fraction and no specific structural heart disease were included, retrospectively. The AF recurrence occurring 3 months after ablation was investigated for 12 months. Serial echocardiographic measurements, including peak atrial systolic mitral inflow velocity (A) and peak atrial systolic mitral annular velocity (a'), were evaluated at baseline, day 1, 3 and 12 month.

Results: AF recurrence occurred in 80 patients. In patients with AF recurrence, there were more persistent AF (63 [78.8%] vs. 47 [40.5%], $P < 0.001$), longer ablation duration (6135 ± 1347 vs. 5280 ± 1797 sec, $P = 0.001$), and higher Left atrial volume index at baseline (35 ± 12 vs. 31 ± 10 mL/m^2, $P = 0.008$). On the other hand, A on day 1 (0.37 ± 0.14 vs. 0.48 ± 0.17m/s, $P < 0.001$) and a' on day 1 (4.4 ± 1.9 vs. 6.2 ± 2.6 cm/s, $P < 0.001$) were lower than those of patients without recurrence. In multivariate Cox regression analysis, the presence of persistent AF and the lower values of A (Hazard ratio [HR] 0.928, 95% confidence interval [CI] 0.957-1.000, $P = 0.046$) and a' (HR 0.848, 9%% CI 0.728-0.989, $P = 0.036$) at day 1 were associated with AF recurrence (Table).

Conclusions: A and a' at day 1 after ablation, as simple parameters for atrial systolic function, could be useful as predictors of AF recurrence.

Table. Cox regression analysis for predicting AF recurrence after catheter ablation

Variable	Univariate analysis			Multivariate analysis					
				Model 1			Model 2		
	HR	95% CI	P	HR	95% CI	P	HR	95% CI	P
Persistent AF	3.737	2.184 – 6.394	<0.001	2.573	1.167 – 5.672	0.019	2.498	1.130 – 5.522	0.024
Ablation duration, sec	1.000198	1.000059 – 1.000336	0.005						
LAVI, mL/m^2	1.029	1.010 – 1.049	0.003						
A at day 1, m/s	0.966	0.951 – 0.983	<0.001	0.978	0.957 – 1.000	0.046			
a' at day 1, cm/s	0.775	0.689 – 0.872	<0.001				0.848	0.728 – 0.989	0.036

CI, confidence interval; HR, hazard ratio; LAVI, left atrial volume index