

9. The Clinical Implication of Cardiopulmonary Exercise Testing Related to Catheter Ablation For Persistent Atrial Fibrillation With Low Grade Symptom

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Background: Pulmonary veins isolation (PVI) is widely accepted as an effective treatment for paroxysmal atrial fibrillation (AF). However, the role of PVI in persistent AF (PeAF) with low grade symptom has not been known. Recently, cardiopulmonary exercise (CPX) testing in patients with heart failure is well established for evaluating cardiopulmonary function objectively. So we tried to find the clinical role of CPX to evaluate clinical symptom more objectively in PeAF with low grade symptom.

Methods: In a prospective multicenter observational registry (Comparison study of Drugs for symptom control and complication prevention of Atrial Fibrillation [CODE-AF] registry), 11,104 patients with nonvalvular PeAF patients with low grade symptom (EHRA symptom score I-II) were consecutively enrolled between June 2016 and April 2020 in Korea. Selected CPX variables were included; peak oxygen uptake (VO_2)/kg, minute ventilator to carbon dioxide production (VE/VCO_2) slope, Max grade, METs, respiratory quotient (RQ). Recurrence free survival rate was measured using a Kaplan-Meier analysis. The influence of clinical, echocardiographic and CPX parameters in recurrence was calculated with Cox-regression analysis.

Results: We identified 74 PeAF patients (mean age 59 ± 8 years, male 82.4 %, EHRA Symptom score \leq II) who experienced pre-PVI CPX. During a mean follow-up of 41 ± 20 months, there were 18 events of recurrence after PVI. Based on the Cox regression analysis, enlarged left atrial diameter was associated with increased risk of recurrence (OR 1.11, $p=0.023$). On the contrary, high VO_2 /kg (>24) was associated decreased risk of recurrence (OR 0.89, $p=0.004$), and low VO_2 /kg (≤ 24) was a strong predictor of recurrence ($p=0.004$) after adjusting age, gender and LA dimension.

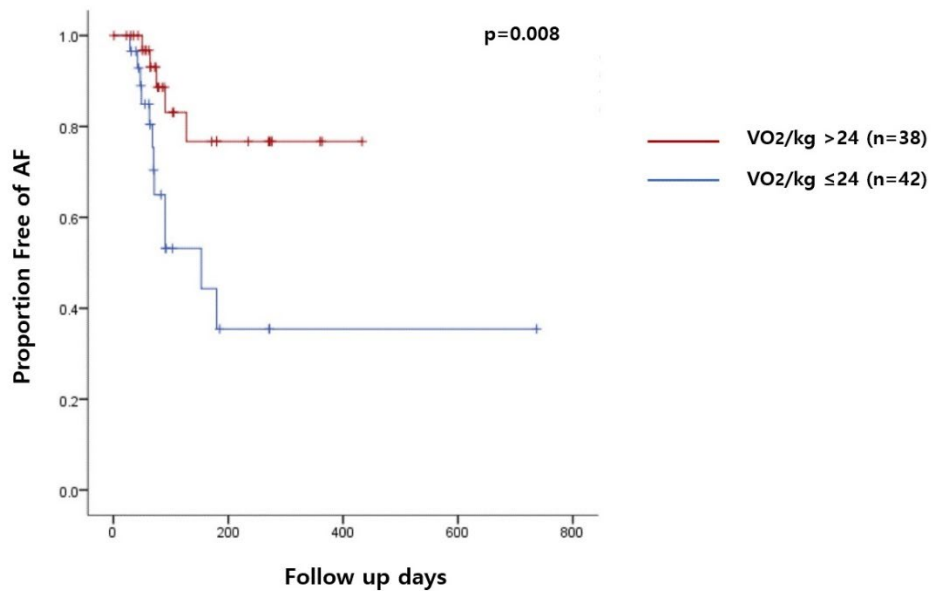
Conclusion: VO_2 /kg is the major independent determinant of recurrence after PVI for PeAF. And this showed important implications to evaluate clinical symptom more objectively for PeAF patients with low grade symptom.

Table. Cox regression analysis of event free survival of AF

	Odds ratio (95% CI)			
	Unadjusted	p value	Adjusted	p value
Age	1.02 (0.96-1.09)	0.535		
Gender	3.04 (0.40-10.03)	0.391		
Max grade	0.70 (0.52-0.95)	0.701		
Mean VE/VCO2 slope	0.97 (0.91-1.04)	0.440		
VO2/kg	0.89 (0.79-0.97)	0.004	0.88 (0.80-0.96)	0.004
METs	0.64 (0.48-0.86)	0.003		
RQ	0.15 (0.01-13.12)	0.405		
LAAP	1.11 (1.02-1.22)	0.023	1.10 (1.00-1.21)	0.062

VE = ventilation, VCO2 = carbon dioxide output, VO2 = Oxygen uptake, METs = metabolic equivalent, RQ = respiratory quotient, LAAP = Left atrium antero-posterior diameter

Figure. Event free survival from atrial fibrillation according to VO₂/kg



Clinical Implications: My study will help enable cardiovascular clinicians to predict recurrence after PVI for PeAF.