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PROGNOSTIC MARKERS OF RHYTHM RESTORATION IN PATIENTS WITH ATRIAL FIBRILLATION AND KIDNEY DYSFUNCTION

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Relevance. Atrial fibrillation (AF) and chronic kidney disease (CKD) frequently coexist and potentiate each other through bidirectional pathophysiological mechanisms. Patients with concurrent AF and CKD face disproportionately higher risks of stroke, bleeding, cardiovascular mortality, and accelerated renal decline compared to those with either condition alone. Despite the growing prevalence of this dual burden the factors that predict successful rhythm recovery (e.g., restoration and maintenance of sinus rhythm) in this population remain incompletely understood. Kidney dysfunction may influence rhythm control outcomes through multiple pathways, including left atrial remodeling, volume overload, electrolyte disturbances, and altered pharmacokinetics of antiarrhythmic drugs. This study therefore analyzes the relationship between AF and kidney dysfunction and investigates the determinants of successful rhythm recovery in this high-risk cohort.

Aim: to identify clinical and echocardiographic biomarkers associated with successful sinus rhythm recovery in patients with atrial fibrillation and associated kidney dysfunction.

Materials and methods. We retrospectively analyzed the data of 60 patients with atrial fibrillation who were admitted to general cardiology department due to rhythm disorder. Patients were stable in ambulatory heart failure symptoms (NYHA class I-III), and did not require hemodynamic support or kidney function support. Spontaneous rhythm restoration was observed in 3 patients (5%), electrical cardioversion in 3 (5%), chemical cardioversion (amiodarone) 11 (18.3%). Among of all patients the comprehensive statistical analysis was performed in those who had laboratory parameters of kidney function at admission (day 1) and full protocol of electrocardiography before discharge, and chemical rhythm restoration, totally 23 patients. Clinical biomarkers included age and eGFR and total protein (TP). Echocardiographic parameters included Left Atrial Volume Index (LAVI) and Left Ventricular Ejection Fraction (LVEF). Comparisons were made using the Mann-Whitney U test (two-tailed) for non-parametric data and Student test for parametric data. Data presented in median.

Results and their discussion. In group 1 with rhythm recovery (8 pts (34.7%) patients were significantly younger (65.5 years vs. 83 years, $p = 0.01$) and had a higher eGFR (64.9 mL/min vs. 45 mL/min, $p = 0.044$) compared to those who did not recover (group 2), groups were similar in TP at admission ($p=0.069$). LAVI and LVEF showed no significant differences between groups. On subgroup analysis according to kidney function, patients with eGFR <60 had significantly larger left atrial volume index compared to those with eGFR >60 (median LAVI: 58 mL/m² vs. 40.4 mL/m², $p = 0.02$), suggesting that left atrial enlargement may mediate the relationship between kidney dysfunction and poor rhythm recovery, but in this small subgroup the value demonstrated just tendency but was not significant (single-factor ANOVA test $p=0.07$). No significant differences in LVEF were observed between eGFR groups in support that LVEF could not provide powerful impact due to its surrogate nature especially in cohort with comorbidity.

Conclusions. In this pilot study of patients with atrial fibrillation and kidney dysfunction, younger age and higher eGFR were associated with successful rhythm recovery. The finding that lower eGFR has tendency to be accompanied with larger left atrial size provides a potential mechanistic link between kidney dysfunction and failed rhythm control. Larger prospective studies are warranted to validate these findings.