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Spironolactone in patients with permanent atrial fibrillation, possible heart failure protective potential

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Background: Atrial fibrillation (AF) promotes electrical, neurohormonal and structural remodeling of atria and ventricles. Long lasting AF leads to atrial interstitial fibrosis, apoptosis, loss of myofibrils and finally to heart failure (HF).

Purpose: The aim of the study was impact of aldosterone antagonist, spironolactone, on exercise tolerance and neurohormonal activity in patients with permanent AF without symptoms of HF.

Methods: In prospective, randomized study patients with permanent AF at least for 1 year, no signs and symptoms of HF and stable clinical condition were included. Patients were randomized to: beta-blocker plus spironolactone (dose: 25 mg) treatment and rate-control treatment with only beta-blocker. Propranolol, metoprolol and bisoprolol were used, doses were adjusted to achieve resting heart rate 60–80/min. Ergospirometry (CPX) and 6-minute walk (6-MWT) tests were performed during separate days.

Results: Study group consisted of 49 patients, 69% men, mean age 62.1±9.6 without structural and chronic active diseases, mean time of arrhythmia was 5.5 years, Q1: 2, Q3: 8 years. Follow-up was 11.2 months. All patients were treated with beta-blockers, 27 patients were treated with 25 mg spironolactone. Surprisingly physical capacity in 6-minute walk test (6-MWT) in studied patients was not significantly reduced in comparison with values ranges for healthy volunteers. After 11.2 months follow-up significantly longer exercise time (433±113 vs. 367±162 sec, $p<0.05$) and lower maximal HR (159±25 vs. 165±22 beats/min, $p<0.0550$) were observed in spironolactone treated group. Other CPX variables did not differ significantly between groups after 11,2 months: VO2: 20.7±5.1 vs. 20.1±4.8 [ml/kg/min]; VO2 as % of normal value: 78.4±15.2 vs. 76.8±15.2; O2 pulse: 12±2.8 vs. 12.7±3.6 [ml/beat]; AT: 1.4±0.3, 1.6±0.5 [L/min]; VE: 74.9±20.0, 72.6±17.9 [L/min]. All spirometric variables worsened after 11.2 months: VC: 4.3±1.1 vs. 3.8±0.8 [L], $p<0.0005$, FVC: 4.2±1.1 vs. 3.8±1.0 $p<0.005$ [L], FEV1: 3.1±0.8 vs. 2.8±0.7 [L], $p<0.01$. In spironolactone treated group after 11.2 months BNP concentrations were significantly lower: Q1: 54, Q2: 83, Q3: 100 vs. Q1: 42, Q2: 93; Q3: 184 ng/L ($p=0.025$) and aldosterone levels were markedly increased: Q1: 216, Q2: 266; Q3:443 vs. Q1: 169; Q2: 228; Q3:294 ng/dL ($p=0.0007$).

Conclusions: In patients with permanent atrial fibrillation cardiopulmonary exercise responses were markedly abnormal, but exercise capacity was increased after spironolactone treatment. Deterioration of spirometry results might be due to beta-blocker treatment. In spironolactone treated group BNP levels were significantly lower what may correspond to its heart failure protective activity.