

## ВЗАИМОСВЯЗЬ МЕРЦАТЕЛЬНОЙ АРИТМИИ И ПОЧЕЧНОЙ ДИСФУНКЦИИ У БОЛЬНЫХ С ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТЬЮ

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*Резюме:* Для оценки взаимосвязи между снижением функции почек при хронической сердечной недостаточности (ХСН) с сохраняющимся синусовым ритмом (СР) и различными формами мерцательной аритмии (МА) было обследовано 105 пациентов с различными функциональными классами ХСН. Выявлено, что у пациентов с постоянной формой МА размеры левого предсердия и масса миокарда левого желудочка были значительно больше, чем у больных с сохраняющимся синусовым ритмом, что сопровождалось также более выраженным нарушением функционального состояния почек.

*Ключевые слова:* функция почек, хроническая сердечная недостаточность, мерцательная аритмия, левое предсердие.

## ӨНӨКӨТ ЖҮРӨК КЕМТИГИ МЕНЕН ООРУГАН ООРУЛАРДЫН БӨЙРӨГҮНҮН ДИСФУНКЦИЯСЫНЫН МЕНЕН МЕРЦАТЕЛДҮҮ АРИТМИЯНЫН ӨЗ АРА БАЙЛАНЫШЫ

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*Корутунду:* Мерцателдүү аритмиянын ар кандай формалары менен синустук ыргакты сактаган өнөкөт жүрөк кемтигинде бөйрөктүн кызматынын начарлашынын ортосундагы өз ара байланышка баа берүү үчүн өнөкөт жүрөк кемтигинин ар кандай түрлөрү менен жабыркаган 105 бейтап текшерүүдөн өткөрүлдү. Мунун натыйжасында, туруктуу мерцателдүү аритмиядан жабыркаган бейтаптардын сол жүрөк толтосунун көлөмү жана сол карынча миокардынын салмагы синустук ыргагы сакталган бөйрөк оорусу менен жабыркаган бейтаптардыкына караганда чоңураак болоору белгилүү болду.

*Негизги сөздөр:* бөйрөктүн кызматы, өнөкөт жүрөк кемтиги, мерцателдүү аритмия, сол жүрөк алды.

## RELATIONSHIP OF ATRIAL FIBRILLATION AND RENAL DYSFUNCTION IN PATIENTS WITH CHRONIC HEART FAILURE

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*Resume:* 105 patients with different functional classes of chronic heart failure (CHF) were investigated for estimation of linkage between renal function reduction of patients with chronic heart failure with conserved sinus rhythm (SR) and different atrial fibrillation (AF) forms. This study has investigated that the patients with constant form of AF have significant larger left auricular dimensions than the patients with conserved SR, which was accompanied by severe renal functional reduction.

*Key words:* renal function, chronic heart failure, atrial fibrillation, left atrium.

In recent years, medicine has faced the problem of “dual epidemic” of heart and kidney failure. There are manifestations of these two clinical conditions, at the same time a number of patients that led to the emergence and introduction of the concept of “cardio-renal syndrome” and increased attention to him as cardiologists and nephrologists [1, 11].

Involvement of the kidneys in many cardiovascular diseases (CVD), arterial hypertension (AH), chronic heart failure (CHF), initially not considered nephropathies, making it necessary to

develop a unified approach to the management of patients with end-stage renal disease, especially in terms of early prevention and treatment of its complications [1].

Reduction in glomerular filtration rate (GFR) is considered as a marker of adverse outcome CVD, which is consistent entrenched concept of cardio renal relationship [1].

It is known that the prognosis of patients with CHF determines AF. The prevalence of AF in patients with HF varies from 4% in functional class (FC) I to 50% in FC IV [2].

Table 1  
Characteristics of patients with chronic failure

Parameters	Number of patients	
	absolute	%
Patients with CHF	105	
Men	99	94.28
Women	6	5.72
Age (in years)	62.6±10.1	
Etiology of CHF		
AH		
CHD	2	1.9
AH and CHD	17	16.2
	86	81.9
FC of CHF		
I	-	-
II	63	60
III	33	31.4
IV	9	8.6
Diabetes melitus	16	15.24
Atrial fibrillation		
Paroxysmal	35	30
Persistent	35	30
Normal	11	-
Bradycardic form	4	-
Tachycardic form	20	-
GFR < 60 ml/min	34	32.4

Interference of AF and the functional state of kidneys in CHF described is not enough.

The aim of our research was to examine the relationship between the reduction in renal function in patients with chronic heart failure with persistent sinus rhythm and various forms of atrial fibrillation.

#### MATERIALS AND METHODS

We examined 105 patients (99 men, 6 women) with CHF II-IV FC, at the age of 34 to 85 years (mean age 62.6±10.1 years). CHF was diagnosed and evaluated according to national guidelines (second revision, 2006) [3]. All patients were on inpatient wards in cardiac arrhythmias and acute myocardial infarction of the National Center of Cardiology and Therapy named Academician Mirsaid Mirrakhimov and received a standard therapy.

All patients had blood taken from the ulnar

vein to determine serum creatinine. GFR was calculated by the formula Cockcroft-Gault [4]:

$$GFR = [(140 - \text{age (years)}) \times \text{weight (kg)} \times 88] / [\text{creatinine (mmol / l)} \times 72],$$

for women the result was multiplied by 0.85.

All patients fulfilled the following instrumental examinations: electro- and echocardiography (EchoCG) study.

By EchoCG was determined following options: the anterior-posterior left atrial size, end-systolic size (ESS), end-diastolic size (EDS), left ventricular (LV) ejection fraction (EF), the thickness of the posterior wall of the LV and thickness of the interventricular septum.

Systolic dysfunction was diagnosed with EF less than 50%.

Statistical data processing was carried out using the program STATISTICA 8 and standard

**Table 2**  
The sizes of the LA and figures  
systolic function of the LV in patients with CHF

Signs	Groups of patients			P <sub>A-B</sub> <	P <sub>A-C</sub> <	P <sub>B-C</sub> <
	Group A, n=35	Group B, n=35	Group C, n=35			
LA, cm	3.71±0.38	3.73±0.54	4.36±0.63	-	0.000	0.000
ESS, cm	4.09±0.96	3.77±0.88	4.36±0.94	-	-	0.008
EDS, cm	5.64±0.78	5.31±0.66	5.8±0.75	0.05	-	0.005

**Table 3**  
EF and frequency of severe CHF in patients examined

Signs	Groups of patients			P <sub>A-B</sub> <	P <sub>A-C</sub> <	P <sub>B-C</sub> <
	Group A, n=35	Group B, n=35	Group C, n=35			
EF, %	50.34±13.32	56.6±13.81	47.14±12.66	0.05	0.05	0.004
EF < 50%	14 (40%)	6 (17.14%)	15 (42.86%)	-	-	-

**Table 4**  
Indicators of GFR in patients with CHF

Signs	Groups of patients			P <sub>A-B</sub> <	P <sub>A-C</sub> <	P <sub>B-C</sub> <
	Group A, n=35	Group B, n=35	Group C, n=35			
GFR, ml/min	84.04±31.74	81.15±28.51	65.38±32.63	-	0.018	0.035

statistical package programs. Reliability of differences was determined using paired Student's t-criteria. The study of the relationship between measures was performed using a correlation analysis with the calculation of the correlation coefficient r. Differences were considered significant at p<0.05.

#### RESULTS AND DISCUSSION

Among the patients we studied the cause of HF in 2 (1.9%) patients had AH, 17 (16.2%) – coronary heart disease (CHD) in 86 (81.9%) – a combination of both (table 1.)

Depending on the availability and form of AF all the patients were divided into three groups:

- In group A included 35 patients with persistent SR,
- In group B – 35 people with paroxysmal AF,
- And in group C – 35 patients with a permanent form of AF.

The dimensions of the left atrium (LA) and characteristics of systolic function of LV in patients examined are shown in table 2.

As can be seen from the data shown in the table 2, patients with CHF with a constant form of AF was observed considerably larger LA compared with patients with SR and paroxysmal AF (4.36±0.63 cm vs. 3.71±0.38 cm and 3.73±0.54 cm respectively, p<0.000). It is known that the factors predisposing to the development of AF, attributed the increase and changes in the myocardium of the LA [2, 5]. In studies of Tsang T. et al. (2002) indicated that the increase of the LA is frequently observed in LV diastolic dysfunction [6], which is the basis of HF in most patients [2, 7]. Later Ananthapanyasut W. et al. (2010) [2, 8] showed that independent predictors of AF were also lower systolic blood pressure and the presence of CHF.

It is known that the most characteristic feature of HF due to CHD, is a dilation of the LV cavity. The increase in LV cavity and decreased EF are associated with increased risk of HF and death [9]. Consequently, LV dimensions can be regarded as a powerful independent predictor of HF and survival of patients with CHD. As can be seen from the data shown in table 2, in group C were considerably

larger LV cavity during systole as ( $4.19 \pm 0.87$  cm vs.  $3.89 \pm 0.75$  cm,  $p < 0.03$ ) and diastolic ( $5.65 \pm 0.65$  cm vs.  $5.53 \pm 0.58$  cm, n/s), underscoring the severity of the patients with a permanent form of AF.

Analysing myocardial contractility (table 3), we observed that in patients with permanent form of AF was significantly worse EF than patients with persistent SR and paroxysmal AF ( $47.19 \pm 12.55\%$  vs.  $50.34 \pm 13.32\%$  and  $56.6 \pm 13.81\%$ , respectively,  $p < 0.004$ ).

The incidence of severe HF (EF < 50%) occurred in 35 patients, while it was detected more frequently in patients with CHF with a permanent form of AF – 42.86% versus 40% in patients with persistent SR, although the differences were not significant (table 3).

Determination of LV EF has important clinical implications because it allows you to divide patients with CHF into two groups – patients with LV systolic dysfunction (LV EF less than 50%) and patients with preserved LV systolic function, treatment approaches are fundamentally different [9].

To evaluate the effect of filtration of renal function on the development of AF in patients with CHF we analyzed GFR, as reflected in table 4. All surveyed patients GFR was, on average  $76.86 \pm 31.8$  ml/min, while in 35 (33.3%) patients it was < 60 ml/min. Next, we compared the performance of GFR according to presence or absence of AF (table 4). As shown in table 4, patients with permanent form of AF rates were significantly lower GFR than patients with SR ( $62.38 \pm 32.63$  ml/min vs.  $84.04 \pm 31.74$  ml/min,  $p < 0, 0018$ ).

In a study of POSH (2006) demonstrated that AF in patients with CHF is an independent predictor of increased concentration in serum creatinine during hospitalization [10, 11]. Later in the works Shutov A.M. et al. (2009) identified the relationship between the decrease in renal filtration and the formation of predisposition to AF [2]. They have shown that the likelihood of AF increased with decreasing GFR, which also was associated with a larger diameter and greater frequency of the LA of mitral regurgitation.

The result of research PRIME II is the assertion that GFR is an independent predictor of overall and cardiovascular mortality, even stronger

than the functional class of HF and LV EF [12, 13].

Thus, on the basis of the above, we concluded that:

1. In patients with heart failure and permanent AF in contrast to patients with persistent sinus rhythm the size of the left atrium was larger.

2. Atrial fibrillation in chronic heart failure is associated with a more pronounced deterioration in the functional state of kidneys – decrease of glomerular filtration rate.

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