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IMPORTANCE OF DAMAGE OF THE HEART IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Abstract
We were investigated 102 patients with rheumatoid arthritis (RA). Research results demonstrated that cardiac pathology has flowed latent and subclinical in this patient's category, i.e. clinical changes by heart was minimal and rarely become on the first place in general view of the disease. In these patients more often, we found infringements morph-functional indexes' on the left part of the heart, diastolic function of the left ventricle, what pointed to no adaptive character modeling left part of the heart.

Keywords: Rheumatoid arthritis, cardiovascular system, diagnostics.

Introduction

Rheumatoid arthritis (RA) is the most common chronic inflammatory disease, with a prevalence of 1-3% in the population. Cardiovascular involvement is considered an extra-articular (systemic) manifestation of RA and is observed in 50-60% of cases according to pathoanatomical data. However, cardiac changes are minimal and rarely take precedence over the overall presentation of the underlying disease [3,5].

Cardiovascular involvement is commonly recognized as an extra-articular manifestation of rheumatoid arthritis. These include pericarditis, valvular lesions, myocarditis, coronary arteritis, conduction system abnormalities, aortitis, and pulmonary hypertension [2,4].

However, cardiac pathology is often not diagnosed in patients with rheumatoid arthritis, fading into the background in comparison with the severe articular

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syndrome. Pericardial or valvular lesions are rarely associated with hemodynamic disturbances and are often detected only by echocardiography. Commonly used clinical and functional research methods allow detecting myocardial damage in 11-40% of patients, and according to autopsy, specific pathological changes in the heart muscle are detected in 44-82% of deceased patients with rheumatoid arthritis and pericarditis. Clinically diagnosed in 2.6-30% of patients (20-40% according to autopsy), heart defects are clinically detected in 1.3-20% of cases [1].

Systemic manifestations of RA, including cardiac involvement, determine the overall prognosis, so their early detection and targeted treatment are important. The frequency of myocardial involvement in myocarditis-like RA has not been determined. This is due, on the one hand, to the difficulty of diagnosing myocarditis in people with limited mobility, and, on the other hand, to the delay in clinical manifestations due to morphological changes in the heart [6,7].

Objective

To improve the diagnosis of heart damage in patients with RA using clinical and instrumental examinations that assess systolic and diastolic cardiac function, intraventricular hemodynamics, and cardiac structural parameters, as well as Holter ECG monitoring.

All patients included in the study underwent echocardiographic examination (EchoCG) using a “MEDISON 8000 LIGHT” (South Korea) ultrasound device with a 2.4 MHz cardiac sensor, according to the standard method in accordance with the recommendations of the American Echocardiographic Association.

Results and discussion

102 patients with RA aged 18 to 40 years (mean age 28.4±3.7) were studied. Men – 10 (9.8%), women – 92 (90.2%). The comparison group consisted of 20 practically healthy people aged 18 to 40 years (29.2±3.5). Patients with RA did not differ from the control group in terms of gender and age. The diagnosis of RA was made in accordance with the criteria of the American College of Rheumatology (1987). Of the 102 RA patients, 69 (67.6%) had DAS 28 activity

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level 3, 20 (1), and the remaining patients (2). 61 (59.8%) patients had rheumatoid factor (RF) seropositive disease. 82 (80.4%) of RA patients had radiological stages 2 and 3 of the disease, and 84 (82.3%) had functional joint damage stages II and III. Systemic symptoms were observed in 21 of 102 patients with RA (20.6%). At the time of the study, 68 (66.66%) patients received methotrexate 7.5–10 mg/week as a basic drug for an average of 2.2±3.9 years. 81 patients (79.4%) received prednisolone 5–20 mg/day. 96 of 102 patients (94.2%) received nonsteroidal anti-inflammatory drugs (NSAIDs).

Rheumatoid heart defects were detected in 4 (3.94%) female patients and were associated with disease activity and rheumatoid factor seropositivity. Echocardiography revealed mitral valve regurgitation (MVR) grade 1 in one patient and grade 2 in 2 patients, as well as both mitral and aortic regurgitation grade 1 in one patient (Figure 1).

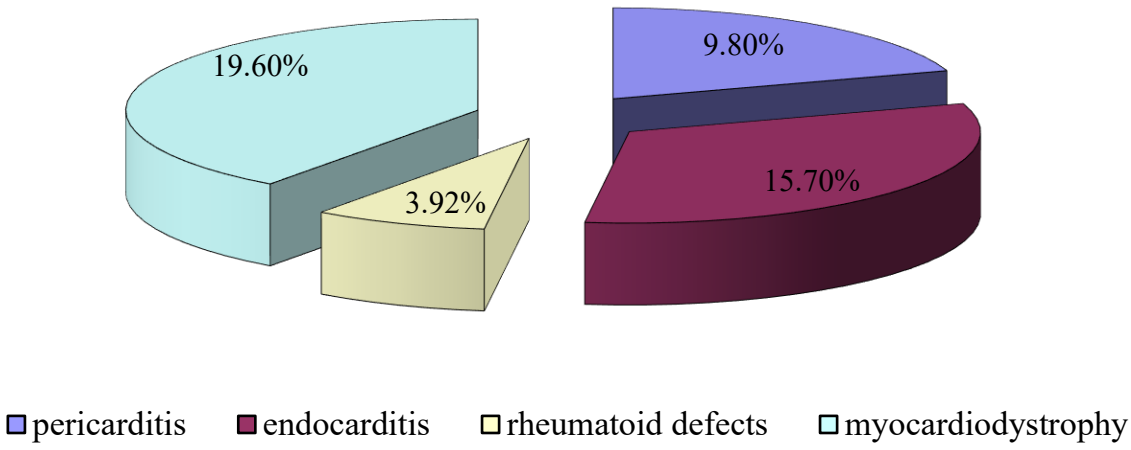

Figure 1. Heart damage in rheumatoid arthritis

In the examination of ExoCG, pericarditis without clinical symptoms was diagnosed in 9 (8.8%) patients, 7 of them had exudative pericarditis without a lot of fluid, and 2 had thickening of pericardial sheets. Pericarditis is often found at a high level of disease activity.

According to echocardiography, pathological changes in the endocardium of the valves were detected in 16 patients. Endocardial damage to the valves was

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manifested by diffuse thickening, unevenness of the valve leaflets, and multiple contours of their shape. Changes in the mitral valve leaflets were observed in 8 patients, mitral and aortic valves in 6, and aortic valve in 2.

Supraventricular arrhythmias were detected in 43.7% of patients with RA during daily ECG monitoring. Ventricular extrasystoles were observed more often than other rhythm disturbances and were detected in 61.8% of patients with RA.

The structural and functional parameters of the left heart chambers were also studied in the patients. According to the results of the examination, left ventricular hypertrophy (LVH) and various types of remodeling were detected in 31 (30.4%) patients with RA. Thus, in 22 (21.56%) patients, eccentric hypertrophy of the left ventricle (ERLV), in 9 (8.82%) patients, concentric remodeling (CRLV) was detected, and in 69.6% of patients, the geometry of the left ventricle was normal. It should be noted that no patient had arterial hypertension before or during the examination.

Increased left ventricular myocardial mass, left ventricular myocardial mass index (LVMMI), and left ventricular posterior wall thickness (LVPWT) were associated with RA seropositivity, disease activity, hypercholesterolemia, elevated serum triglycerides, and methotrexate use. RA patients with CRLV were older than patients with ERLV.

Table 1 Main echocardiographic indicators of left ventricular hypertrophy in patients with RA (M±m)

Indicators	**Control group (n=20)**	**РАли беморлар (n=31)**	
		Methotrexate (n=19)	**Plaquenil (n=12)**
EDD# (см)	4,50±0,260	5,48±0,120*	5,12±0,134*
TIVS# (см)	0,84±0,010	1,36±0,021*	1,23±0,014*^
LVPWT (см)	0,80±0,020	1,32±0,023*	1,26±0,018*
LVMMI (g/m^2)	84,41±2,020	132,03±1,520*	118,62±2,130*^
RTW#	0,36±0,020	0,48±0,120*	0,49±0,075*

Note: * p- significant difference from the control group
^p- significant difference between patients receiving methotrexate and plaquenil
#TIVS - thickness of the interventricular septum

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#EDD - left ventricular end-diastolic dimension on echocardiography
#RTW - relative thickness of the walls of the left ventricle

Diastolic transmitral blood flow (DTBF) dopplerography revealed a reliable decrease in the maximal velocity of premature filling (E) of LV and an increase in the maximal velocity of partial filling (A) ($p<0.01$ for both parameters) (table 2). In our study, 27 (26.6%) patients had transmissural Doppler blood flow changes (E/A ratio < 1.0 (0.78±0.02), which indicated the presence of LV diastolic dysfunction (DDF) in normal stroke volume parameters. In 10% of patients with RA, depending on the level of disease activity, there was an increase in the thickness of the LVMM, LVMMI, as well as the thickness of the LV posterior wall and interventricular septum.

Table 2. Indicators of left ventricular diastolic function in patients with rheumatoid arthritis

Indicators	Patients with RA		Control group (n=20)
	Those receiving MT (n=68)	Those receiving Plaquenil (n=34)	
Speed E, m/s	0,51±0,10	0,59±0,09	0,68±0,07
Speed A, m/s	0,57±0,11	0,53±0,08	0,43±0,11
E/A ratio	0,87±0,26*	1,22±0,10*	1,58±0,03
IVRT m/s	84,51±1,14*	79,0±1,10*^	66,14±0,65
E slow, time m/s	167,16±1,03*	163,0±1,04*^	149,0±1,45

Note: *p<0.01 significant difference with the control group
^p<0.01 significant difference between the groups receiving MT and those not receiving MT

DDF was associated with high activity of the process, age of patients, and relative thickness of the left ventricular walls (table 3).

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Table 3. Diastolic dysfunction in patients with RA depending on clinical symptoms

Clinical characteristics of patients with RA		LV diastolic dysfunction			
		Patients with DDF		Patients without DDF	
		n	%	n	%
course	fast developing	1	3,7	3	4
	slow developing	26	96,3	72	96
according to RF	seropositive	22	81,5	34	45,33
	seronegative	5	18,5	41	54,66
ACCP	positive	25	92,6	39	52,00
	negative	2	7,4	36	48,00
Activity level	1	7	25,9	9	12
	2	18	66,66	57	76
	3	2	7,4	9	12
Age of patients, years	under 20	8	29,6	22	29,33
	20-30 years old	12	44,4	48	64
	30-40 years old	7	25,9	5	6,66
Disease duration, years	1-5 years	6	22,2	30	40
	5-10 years	11	40,7	32	42,66
	>10 years	10	37,03	3	4
Extra-articular marks are	present	9	33,33	10	13,33
	no	18	66,66	65	86,66
Basic treatment	with MT	16	59,26	52	69,33
	without MT	11	40,74	12	16

Conclusions:

1. Cardiac pathology in patients with RA is often latent and has a subclinical course - in this case, clinical changes from the heart are rarely observed and rarely take the lead in the overall picture of the disease
2. In young patients with RA, with high disease activity, changes in the structural and functional parameters of the left chambers of the heart and impaired left ventricular diastolic function are often observed, which indicates maladaptive remodeling of the left heart chambers.
3. The risk of developing cardiovascular disease in young patients with RA was associated with disease duration of more than 5 years, high activity level, and the presence of systemic lesions.

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