

Rhythm and Conductivity Disorders in Patients with Hypertension

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Article History	Abstract
<p>Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 28 Nov 2023</p>	<p>Purpose of the study: to study the prevalence and structure of arrhythmias and conduction disorders and various types of heart remodeling in patients with hypertension among men and women. Material and methods: The study was conducted in the Bukhara branch of the Republican Specialized Scientific and Practical Medical Center for Cardiology involving 75 men and 43 women with HD; The mean age of men with hypertension and rhythm and conduction disorders was 62.86 ± 1.91 years, and women - 68.29 ± 2.34 years ($p < 0.05$). An anamnesis, ambulatory blood pressure monitoring (ABPM), Holter monitoring of the electrocardiogram (HM-ECG) were taken. Results. Among patients with GB, rhythm and conduction disturbances were detected in 64% of men and 46.51% of women. Men with hypertension and rhythm and conduction disorders are younger than women (58.86 ± 1.91 years and 68.29 ± 2.34 years, respectively). Among rhythm disturbances, SVT (34.69% of men and 56.52% of women), PVC (28.57% of men and 26.09% of women) and AF (14.28% of men and 21.73% of women) were more common. The most common finding on ultrasound of the heart was dilatation of the left atrium (53.33% of men and 37.20% of women) and both atria (6.67% of men and 2.32% of women); LVH - in 56% of men and 44.18% of women; pulmonary hypertension - in 18.67% of men and 25.58% of women. It is necessary to dynamically monitor patients with hypertension with regular examinations to identify signs of disorders in the state of the cardiovascular system, in particular rhythm and conduction disturbances.</p>
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1. Introduction

Essential arterial hypertension (AH) and associated cardiovascular complications (CVS) continue to be one of the main problems of modern medicine, despite significant advances in the treatment of these conditions [1, 2]. It has been established that left ventricular hypertrophy (LVH) is an independent risk factor for cardiovascular morbidity and mortality, including those due to the occurrence of cardiac arrhythmias (AHRs) [1,3,4]. It has been shown that the frequency of various NRS in AH reaches 96%, which is 10 times higher than in normotensive individuals [5,6].

In recent years, the role of arterial hypertension in the development of cardiac arrhythmias has been actively studied. The factors of arterial hypertension that determine the electrophysiological remodeling of the heart and the manifestation of arrhythmias include: pathogenetic mechanisms for the development of arterial hypertension, which also have a proarrhythmic effect, risk factors for the development of arterial hypertension and cardiovascular diseases, structural and functional changes in the heart. which include left ventricular diastolic dysfunction (LVDD) and left ventricular hypertrophy (LVH), cardio-associated clinical conditions, drug-induced iatrogenic factors [2]. In patients with hypertension, as the progression progresses, prerequisites appear for the development of cardiac arrhythmias at all stages of the cardiovascular continuum.

AH is the main risk factor for the development of AF. In the presence of arterial hypertension in men and women, the risk of developing AF increases in a ratio of 1:5, 1:4, respectively. The Framingham

study showed that LVH increases the risk of developing AF by 3–4 times in patients of the same age [4,9]. According to modern concepts, it is the structural remodeling of the left atrium (LA) that is defined as the key mechanism for the onset and maintenance of AF [6]. In patients with uncompensated AH, dilatation of the LA increases the risk of developing AF by 2.15 times [4]. Several population-based studies have used LVH, LVDD, and left ventricular dilatation as markers to predict risk for CV events and AF. In patients with uncompensated AH, LVH increases the risk of developing AF by 2.9 times [4,7].

In LVH, ion channel remodeling occurs, resulting in a change in depolarization. Simultaneously with this, gap junction remodeling occurs, in connection with which anomalous pulse conduction appears [2,3]. All this leads to changes in the ECG and arrhythmias.

According to some data, among ventricular arrhythmias in both men and women, rare ventricular extrasystoles (VE), polymorphic PVCs, as well as frequent and complex ventricular arrhythmias in AH with and without LVH are the most common. Polymorphic PVC is somewhat more common in AH patients with LVH [2,5,8].

Purpose of the study: to study the prevalence and structure of arrhythmias and conduction disorders and various types of heart remodeling in patients with hypertension among men and women.

2. Materials And Methods

The study was conducted in the Bukhara branch of the Republican Specialized Scientific and Practical Medical Center for Cardiology involving 75 men and 43 women with HD; The mean age of men with hypertension and rhythm and conduction disorders was 62.86 ± 1.91 years, and women - 68.29 ± 2.34 years ($p < 0.05$).

An anamnesis, ambulatory blood pressure monitoring (ABPM), Holter monitoring of the electrocardiogram (HM-ECG) were taken.

67 patients (56.8%) were diagnosed with stage I GB and 51 patients (43.2%) with stage II. Taking into account daily levels of clinical BP, 50 patients were diagnosed with stage I AH (42.4%) and 68 patients (57.6%) with stage II. According to echocardiography, the patients were divided into 2 groups. Group 1 included 47 patients (39.8%) with LVH, group 2 included 71 patients (60.2%) who did not have LVH.

In order to diagnose paroxysmal forms of arrhythmia, stressful and painless forms of ischemia, 24-hour Holter ECG monitoring was performed using a Cardiomax device (USA) according to the standard method. Leads V2, V5 and avF were recorded. We took into account the average, minimum and maximum heart rate in the daytime, night and daytime, the main rhythms and arrhythmias: supraventricular and ventricular ectopic activity with a gradation of degrees according to Laun-Wolf, ST-T wave dynamics at rest and during exercise, diagnostically significant changes in the segment ST by ischemic type, episodes of painless myocardial ischemia. To diagnose arrhythmias, left ventricular (LV) and left atrium (LA) myocardial hypertrophy, and myocardial electrical instability, the following parameters were evaluated: RR, PQ, QRS, QT, QTC intervals; amplitude and polarity of P, R, S and T waves;

Structural and functional parameters of the heart were studied by doppler echocardiography using an Acuson X300 device (Siemens-Acuson, Germany) in sinus rhythm. End-systolic and end-diastolic diameters of the left ventricle (LV), left atrial volume index, LV ejection fraction, and cardiac index were calculated. Statistical processing - Pearson's test, with Yates correction, Fisher's exact test, Student's exact test (significance of differences at $p < 0.05$).

3. Results and Discussion

When analyzing the data obtained from standard ECG and ECG monitoring in patients with HT, rhythm and conduction disturbances were detected in 49 men (64% of men with HT) and 23 women (46.51%) - $p > 0.05$. GB in all patients was confirmed by ABPM results. Next, the clinical characteristics of patients in the compared groups were studied (Table 1)

Table 1 Clinical characteristics of patients in groups

Sign	1-group n=47	2--group n=71
Men, n / %	35 (74,5%)	40 (56,3%)
Women, n / %	12 (25,5%)	31 (43,7%)
AH I degree, n / %	21 (44,7%)	29 (40,8%)
AH II degree, n / %, n / %	26 (55,3%)	42 (59,2%)
Rhythm and conduction disorders, n / %	29 (61,7%)	19 (26,8%)

DM type 2, n / %	9 (19,1%)	9 (12,7%)
Chronic kidney disease, n / %	10 (21,3%)	12 (16,9%)
Abdominal obesity, n/%	14 (29,8%)	13 (18,3%)
Dyslipidemia, n / %	19 (40,4%)	18 (25,4%)

Analysis of the obtained data shows that among patients of the 1st group, the prevalence of type 2 DM, abdominal obesity and dyslipidemia was higher (19.1%; 29.8% and 40.4%, respectively) than in the 2nd group.

The study of the nature of cardiac arrhythmias shows that the most common arrhythmias in patients with GB are atrial fibrillation (AF), ventricular and supraventricular extrasystoles, as well as various paroxysmal supraventricular tachycardias (Table 2). At the same time, in the 1st group, AF and ventricular extrasystole were detected 2–3 times more often than in the 2nd group.

Table 2 The nature of cardiac arrhythmias in patients with arterial hypertension

№	Types of rhythm disturbance	1-group n=47		2--group n=71	
		n	%	n	%
1.	Supraventricular extrasystoles	7	14,9	8	11,3
2.	Ventricular extrasystoles	8	17,0	4	5,63
3.	Supraventricular tachycardia	6	12,8	3	4,2
4.	Ventricular tachycardia	2	4,3	-	-
5.	Atrial fibrillation	9	19,1	5	7,04
6.	SA-bl. II degree.	1	2,1	-	-
7.	AV block I and II degree	3	6,4	2	4,7
8.	Complete blockade of the legs of the bundle of His	6	12,8	5	7,04
9.	Combined arrhythmias	7	14,9	3	4,2

In the structure of rhythm and conduction disturbances, there were: supraventricular extrasystoles (SVEP) in 7 patients of group 1 (14.9% of the number of patients with left ventricular hypertrophy) and in group 2 in 8 (11.3% of the number of patients with no left ventricular hypertrophy) ventricle), ventricular extrasystoles (PVC) - in 8 patients with LVH and in 4 patients from group 2 (17.0% and 5.63%, respectively), supraventricular tachycardia (SVT) in 6 patients from group 1 in 3 patients 2 groups (12.8% and 4.2%, respectively), ventricular tachycardia (VT) - in 2 patients with LVH (4.3%), and among patients with no LVH was not detected.

SA-bl. II Art. - was detected only in 1 patient from group 1 (2.1%), AV block I and IIct. - found in 3 patients from group 1 and in patients from group 2 did not depend on left ventricular hypertrophy (6.4% and 4.7%, respectively). Complete blockade of the legs of the bundle of His was detected among patients of the 1st group in 6 (12.8%) and in the 2nd group in 5 (7.04%) patients. Differences in these parameters between groups ($p < 0.05$).

Table 3 Structural and functional indicators of the heart among men and women

Indicators	Men n=75		Women n=43	
	n	%	n	%
Dilatation of the left atrium	40	53,33%	16	37,20%
Dilatation of both atria	5	6,67%	1	2,32%
Dilatation of the right ventricle	2	2,66%	-	-
Dilatation of the left side of the heart	2	2,66%	-	-
Akinesis of the walls of the left ventricle	3	4 %	1	2,32%
Ejection fraction reduction	2	2,67%	-	-
Left ventricular hypertrophy	42	56 %	19	44,18%
Pulmonary hypertension	14	18,67%	11	25,58%

According to the results of cardiac ultrasound, 40 men (53.33% of the number of men with HA) and 16 women (37.20% of the women with HA) had dilatation of the left atrium, 5 men and 1 woman (6.67% and 2.32%, respectively), dilatation of the right ventricle - 2 men (2.66%), dilatation of the left heart - 2 men (2.66%), akinesis of the walls of the left ventricle - 3 men and 1 woman (4% and 2.32%, respectively), a decrease in ejection fraction - in 2 men (2.67%). And also determined: left ventricular hypertrophy (LVH) - in 42 men (56%) and 19 women (44.18%); pulmonary hypertension - in 14 men

(18.67%) and 11 women (25.58%). Differences in these parameters between men and women are not statistically significant ($p > 0.05$).

Thus, despite the echocardiographic diagnostic criteria for LVH, morphofunctional remodeling of the heart remains a reliable predictor of cardiovascular complications, including the development of prognostic adverse cardiac arrhythmias.

One of the triggers of arrhythmogenesis in AH is the morphofunctional remodeling of the heart, which leads to disruption of transmembrane ion channels [7,8]. Therefore, LV diastolic dysfunction, LA size and function, and LVH have been proposed as major risk factors for HRS in hypertensive patients [2,10]. The importance of systemic hypertension as a strong and independent risk factor for supraventricular and ventricular arrhythmias, whose presence and severity have a negative impact on morbidity and mortality, as well as on the quality of life of these patients, has been proven [4,6].

It has also been proven that the pathogenetic mechanisms of the development and progression of hypertension, such as electrolyte disturbances, hyperactivity of sympathetic regulation, sharp fluctuations in blood pressure and episodes of transient myocardial ischemia, contribute to an increase in the proarrhythmic potential of the heart muscle. heart on the background of LVH [4, 9]. It has been shown that the presence of hypertensive LVH also contributes to the progression of the course of the existing NRS. S. Chatterjee et al. (2014), according to a meta-analysis of 10 randomized clinical trials studying the relationship between LVH and persistent cardiac arrhythmias in more than 27,000 patients with hypertension, supraventricular tachycardia in the presence of LVH was detected in 11.1% of cases, and in the absence of LVH - in 1.1% of cases ($p < 0.001$), ventricular arrhythmias - in 5.5 and 1.2% of cases, respectively ($p < 0.001$).

4. Conclusion

Among patients with GB, rhythm and conduction disturbances were detected in 64% of men and 46.51% of women. Men with hypertension and rhythm and conduction disorders are younger than women (58.86 ± 1.91 years and 68.29 ± 2.34 years, respectively).

Among rhythm disturbances, SVT (34.69% of men and 56.52% of women), PVC (28.57% of men and 26.09% of women) and AF (14.28% of men and 21.73% of women) were more common.

The most common finding on ultrasound of the heart was dilatation of the left atrium (53.33% of men and 37.20% of women) and both atria (6.67% of men and 2.32% of women); LVH - in 56% of men and 44.18% of women; pulmonary hypertension - in 18.67% of men and 25.58% of women. It is necessary to dynamically monitor patients with hypertension with regular examinations to identify signs of disorders in the state of the cardiovascular system, in particular rhythm and conduction disturbances.

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