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Evaluation of the Frequency of Heart Arrhythmias and Indicators of Ventricular Repolarization in Patients with Hypertension Crisis

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ABSTRACT

In this study, the frequency of occurrence of arrhythmias in patients with a hypertensive crisis who sought medical help at the Samarkand Regional Branch of the Republican Specialized Scientific and Practical Medical Center for Cardiology (SRF RSNPMCK) was studied. for the period 2020-2022 The object of our study was 12 3 patients with essential hypertension (AH) complicated by hypertensive crisis . According to the results, it was found that in patients with stage III hypertension complicated by a hypertensive crisis, significantly more often than in stage II hypertension, cardiac arrhythmias of all gradations were recorded, and with an increase in the degree of AH, the Lown class increased.

Relevance.

Hypertension (AH) is the most common problem worldwide, as it is the main cause of mortality and early disability of patients [1, 18,14]. According to many studies, HD affects 65 to 72 million people in the United States [8 , 13] and up to 1 billion people worldwide [6 , 15]. In the Russian Federation, the incidence of HD in 2018 was 39.5% and for the period 2019-2021 before this figure was 40.4% [3 , 4]. In the last decade in Uzbekistan, there has been a trend towards an increase in the incidence of GB. Unfortunately, only 9 to 14% of HD patients control their blood pressure and about 30% of HD patients are unaware of their disease. Despite the currently available wide arsenal of methods for diagnosing and treating HD, in most countries of the world it is not possible to achieve adequate control of this disease. The probability of developing HD increases with age [5, 20]. According to many studies in the last 10 years, there has been a trend towards a more severe course of AH, manifested by an increase in the frequency of complications, primarily hypertensive crises (HC), cerebrovascular complications such as strokes and hypertensive encephalopathy [2, 7, 19].

In recent years, the role of GB in the development of cardiac arrhythmias has been actively studied. The factors determining the electrophysiological remodeling of the heart and the manifestation of arrhythmias in HT include: pathogenetic mechanisms of HT development, which also have a proarrhythmic effect, risk factors for HT, structural and functional changes in the heart (left ventricular diastolic dysfunction (LVDD) and left ventricular hypertrophy (LVH)), cardiac associated clinical conditions, drug iatrogenic factors [2 , 6, 10]. As GB progresses, patients develop prerequisites for the occurrence of cardiac arrhythmias at all stages of the

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disease. In LVH, ion channels are remodeled , leading to a change in depolarization, and gap junctions are remodeled , contributing to abnormal impulse conduction [2, 3 , 17, 19, 25]. All this leads to changes in the ECG and arrhythmias. With the development of atrial fibrillation (AF), the main risk factor is HA, in which structural remodeling of the left atrium (LA) occurs and this is a key mechanism in the onset and maintenance of AF. In the presence of HD in men and women, the risk of AF increases by 1:5, 1:4, respectively [4 , 9, 24]. According to some data, among ventricular arrhythmias, both in men and women, rare ventricular extrasystoles (VECs), polymorphic VECs, as well as frequent and complex ventricular arrhythmias in AH with LVH and without LVH are most common. Polymorphic PVC occurs somewhat more often in persons with AH in the presence of LVH [2 , 12, 22]. In isolated LVDD, supraventricular arrhythmias are predominantly diagnosed , including paroxysmal AF [3 , 11, 23]. With LVH in combination with LVDD, mainly ventricular arrhythmias occur, up to paroxysmal ventricular tachycardia and ventricular fibrillation.

Thus, due to a complex of pathogenetic factors, including structural and functional changes in the myocardium, arterial hypertension contributes to the development of cardiac arrhythmias, which requires timely detection of these changes and adequate drug correction.

Target. to evaluate the incidence of cardiac arrhythmias and indicators of ventricular repolarization in patients with hypertensive crisis

Materials and methods. The study included 123 patients diagnosed with stage II and III hypertension , hospitalized in the Department of Hypertension of the Samarkand Regional Branch of the Republican Specialized Scientific and Practical Medical Center for Cardiology (SRF RSNPMCK) for the period 2020-2022 Depending on the stage of AH, the patients were divided into 2 groups: the 1st group included 66 patients with AH stage II , the 2nd group included 57 patients with AH stage III . The arterial pressure of patients of the main group was SBP from 140 to 200 mm Hg , DBP from 90 to 120 mm Hg , the duration of the disease was on average 6.2±3.4 years. The mean age of the patients was 54.9±2.2 years. The control group included 60 people comparable in basic characteristics with patients of the main group, whose average age was 58.4±2.9 years. All examined patients underwent a standard 12-channel ECG with analysis of indicators ventricular repolarization according to the generally accepted method and 24-hour Holter ECG monitoring . Statistica 7.0 software package (Statsoft) was used for statistical analysis , non-parametric methods of description (in the form of M±m) and data comparison (Mann - Whitney U- Test) were used.

Results. Heart rhythm disturbances in the main group were detected in 109 (93.02%) patients with AH and in 31 (60.0%) patients in the control group. In patients in the 1st group, ectopic ventricular and supraventricular activity was higher than in the 2nd group. During 24-hour ECG monitoring in patients with GB, various arrhythmias were revealed (Table 1). So, if the frequency of single supraventricular extrasystoles was approximately the same in patients of the 1st and 2nd groups, then paired and group supraventricular extrasystoles, as well as single and paired ventricular extrasystoles, were significantly more often found in patients of the 2nd group. Group ventricular extrasystoles were noted only in the group of patients with MS. There were also gender differences: men with GB had a higher frequency of supraventricular and ventricular extrasystoles compared to women. The average daily number of rhythm disturbances was also higher in patients with HD III stages . Our studies have shown that HA already in the initial stages is associated with rhythm disturbances: high-grade ventricular extrasystole, supraventricular extrasystole, tachyarrhythmias , sinus node dysfunction [4 , 21].

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Table 1. The frequency of occurrence of rhythm disturbances in patients with hypertension complicated by hypertensive crisis

	Patients with GB	
Index	1st group (n =56)	2nd group (n =57)
Single NJE	21 (72.41%)	15 (83.3%)
Paired NJE	11 (37.93%)	10 (43.47%)
Group NJE	4 (12.5%)	10 (43.47%)
NJ tachycardia	8 (27.58%)	4 (17.39%)
Single PVCs	11 (37.93%)	12 (66.6%)
Pair PVCs	2 (6.89%)	2 (8.7%)
Group PVCs	1 (3.44%)	-

The average values of circadian maxima of VEC and NVEC were 43 (10; 125) and 24 (3; 35) in the 1st group, 26 (1:31) and 23 (1:5) in the 2nd group ($p< 0.01$). Paired PVCs (23.2% of the examined), paired SVEs (21.5%) and group SVE C (18.4%) were found in patients with GB.

Atrial fibrillation is significantly higher among patients of the 2nd group: paroxysms of fibrillation - atrial flutter - were detected in 19% of patients of the 2nd group and in 14% of patients of the 1st group. Regression analysis showed that HA is an independent risk factor for the occurrence of paroxysmal fibrillation - atrial flutter. Analysis of myocardial repolarization indicators revealed an increase in mean values uncorrected and corrected QT intervals. With the increase in the degree of hypertension , the shifts in the indicators of repolarization dispersion increased : for example, the value of DQ- TC in the group of patients with a high degree of blood pressure (SBP 180-200 mm Hg , DBP 100-120 mm Hg) was 104.5 ±3.5 ms compared with DQ-Tc values in the group of patients with mild and moderate AH (98.0±1.8 and 105.5±2.2 ms , respectively). When evaluating of the relationship between repolarization dispersion and the number of high-grade ventricular arrhythmias (III-V according to Laun -Wolf), direct significant correlations were found with DQ-T - $r=0.32$ ($p<0.05$), with DQ- Tc -$r=0.37$ ($p<0.05$).

Conclusion. In patients with stage III AH complicated by a hypertensive crisis, significantly more often than in stage II AH , cardiac arrhythmias of all gradations are recorded, and with an increase in the degree of AH, the Lown class increases . In patients with GB complicated by crisis flow, there is also a violation of the processes of ventricular repolarization, more pronounced in severe disease. These shifts reflect the inhomogeneity ventricular repolarization, which are associated with an increased risk of cardiac arrhythmias.

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