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Resume

Changes in blood pressure during the day lead to the development of left ventricular (LV) remodeling, which includes the processes of hypertrophy and dilatation, changes in geometry and impaired contractility of the myocardium, which manifests itself in a violation of its diastolic function. Structural changes in the LV are accompanied by an overload of the left atrium (LA) and is a factor predisposing to the development of rhythm disturbances. Indices of EDV by 9%, LVM by 34% and LVMI by 71% were higher in the group of patients with hypertension and heart rhythm disturbances; LV ejection fraction was 9% lower in relation to patients with AH without cardiac rhythm disturbances.

Key words: left ventricular remodelling, left atrial remodelling, cardiac arrhythmias, arterial hypertension, left ventricular myocardial hypertrophy.

ДИАГНОСТИКА ФУНКЦИОНАЛЬНЫХ ИЗМЕНЕНИЙ ЛЕВОГО ЖЕЛУДОЧКА ПРИВОДЯЩИХ К НАРУШЕНИЯ РИТМА СЕРДЦА

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Резюме,

Изменения артериального давления в течении суток приводит к развитию ремоделирование левого желудочка (ЛЖ), включающее в себя процессы гипертрофии и дилатации, изменения геометрии и нарушения сократительной способности миокарда, которая проявляется в нарушении диастолической его функции. Структурные изменения ЛЖ сопровождаются перегрузкой левого предсердия (ЛП) и является фактором, предрасполагающим к развитию нарушения ритма. Показатели КДО на 9%, ММЛЖ на 34% и ИММЖ ЛЖ на 71% были больше в группе больных с АГ и нарушением ритма сердце, показатель ФВ ЛЖ на 9% ниже по отношению к пациентов с АГ без нарушения ритма сердца.

Ключевые слова: ремоделирование левого желудочка ремоделирование левого предсердия, нарушения ритма сердца, артериальная гипертензия, гипертрофия миокарда левого желудочка.

YURAK RITMNING BUZILISHIDA CHAP K¸ORINCHANING FUNKTSIONAL ŬZGARISHLARINING DIAGNOSTIKASI

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Rezyume

Kun davomida qon bosimining o'zgarishi gipertrofiya va dilatatsiya jarayonlarini, geometriyadagi o'zgarishlarni va miyokardning kontraktilligini buzadigan chap qorincha (LV) qayta qurish rivojlanishiga olib keladi, bu uning diastolik funktsiyasining buzilishida o'zini namoyon qiladi. LVdagi tarkibiy o'zgarishlar chap atriumning (LA) ortiqcha yuklanishi bilan birga keladi va bu ritm buzilishlarini rivojlanishiga moyil bo'lgan omil. Gipertenziya va yurak ritmining buzilishi bilan og'rigan bemorlar guruhida EDV ko'rsatkichlari 9% ga, LVM 34% ga va LVMI 71% ga yuqori bo'lsa, LVEF yurak ritmining buzilishi bo'lmagan gipertoniya bilan og'rigan bemorlarga nisbatan 9% ga kam edi.

Kalit so'zlar: chap qorinchani qayta qurish, chap atriyalni qayta qurish, yurak ritmining buzilishi, arterial gipertenziya, chap qorincha miyokardiyal gipertrofiyasi.

Relevance

Increased blood pressure is the cause of the development of cardiac arrhythmias of ventricular extrasystoles (PVCs), tachycardia, atrial fibrillation (AF). Of particular importance for the development of tachycardia, PVC, AF belongs to structural changes in the atria such as "stunnedness" or stunning myocardium [3]. A natural consequence of arterial hypertension (AH) is the formation of left ventricular hypertrophy (LVH), which leads to an increase in left ventricular (LV) rigidity and worsening of its diastolic relaxation, which leads to LV diastolic dysfunction [1,2].

Co-authors came to the conclusion that any increase in the size of the left atrium (LA) increases the likelihood of developing various rhythm disturbances [11]. And in 1986 M.S. Kushakovsky described dilatation of the left atrium as a prerequisite for the inevitability of atrial fibrillation [4]. It is known that atrial myocardial dystrophy with their subsequent "primary" and "secondary" (retrograde) expansion create a substrate for sinus rhythm disturbances (SR). However, earlier, in 1949, E. Phillip and S. Levin reported on the possibility of developing paroxysms of tachycardia, atrial fibrillation (AF) in people who do not have any heart disease, except for the tachyarrhythmia itself.

It is known that in hypertension, remodeling of the left ventricle (LV) develops, including the processes of hypertrophy and dilatation, changes in geometry and impairment of its systolic and diastolic functions [5]. Structural changes in the LV are accompanied by LA overload and its dilatation, which, in turn, is a factor predisposing to the development of rhythm disturbances. On the other hand, this rhythm disturbance itself causes LA dilatation [6,7,8]. However, recent research data indicate that a more accurate marker of LA structural remodeling is the LA volume index (LPI) [9, 10]. In the mosaic lesion of the myocardium, there are areas without signs of mechanical activity, but with preserved basic physiological functions. Departure from this ideal geometry dictates the need for early application of diagnostic methods for the "dormant", "stunned" left atrial myocardium.

The aim of the study was to study the features of cardiac arrhythmias in left atrial stanning at the early stages of left ventricular remodeling in hypertensive patients with left ventricular myocardial hypertrophy and hypertension without left ventricular hypertrophy.

Materials and methods

The study was conducted in 73 outpatients with hypertension and rhythm disturbances aged 30 to 56 years (mean age 40.2 ± 2.7 years). The observation period was 6 months. Patients complained of palpitations, recurrent discomfort behind the breastbone, feeling short of breath, and destabilization of blood pressure. A Helter ECG and an ultrasound examination (ECHOKG) were performed. In order to diagnose left ventricular (LV) remodelling, the myocardial mass, myocardial mass index, and relative wall thickness index were determined. To assess the geometric model of the LV, we used the classification (normal LV geometry, concentric left ventricular remodelling - ECD, concentric LV hypertrophy - eccentric LV hypertrophy).

The patients were divided into 2 groups: group 1 - control group (n = 32) with hypertension without heart rhythm disturbances. The duration of AH was 4.894 ± 2.21 years, in group 2 (n = 41) with hypertension and cardiac arrhythmias - tachycardia, PVC, impaired repolarization of the ventricles. The duration of hypertension in this group was 5.820 ± 3.21 years. In the presented group, during the study, we identified the following variants of heart rhythm disturbances: tachycardia - 10 (24%), frequent ventricular monotopic extra systole - 18 (44%), polytopic - 6 (33%), atrial fibrillation - 13 (32%)

Statistical processing of the obtained results was carried out using the statistical package "Statisticav.6.0". The arithmetic mean (M) and the error of the mean (m) were calculated. The normality of the sample distribution was assessed by the Kolmogorov - Smirnov test. The reliability of the differences between the values was determined using the Student's t-test with a normal distribution of the trait, with the distribution of a trait different from normal - using the nonparametric Mann - Whitney method. For the analysis of qualitative features, Fisher's exact test and $\chi 2$ were used. Differences were considered significant at $p \leq 0.05$.

Results and its discussion

Indicators of systolic (SBP) and diastolic blood pressure (DBP) in patients in group 2 were relatively higher, i.e. by 8.4% and 12% ($p < 0.05$), in relation to patients of group 1 of the study.

In the present work, we revealed normal LV myocardial hypertrophy in the 1st group was found in 3.1% (n = 1), in the 2nd group in 4.8% (n = 2). Changes in geometry among hypertensive patients without cardiac arrhythmias were found in the largest number of patients with concentric myocardial remodeling - 21.9% (n = 7) (Table 1). In the group of patients with essential hypertension and cardiac arrhythmias, persons

with concentric LV hypertrophy (39%) (n = 16) dominated, while concentric remodeling was observed in 29.3% (n = 12). Eccentric hypertrophy 21.9% (n = 9).

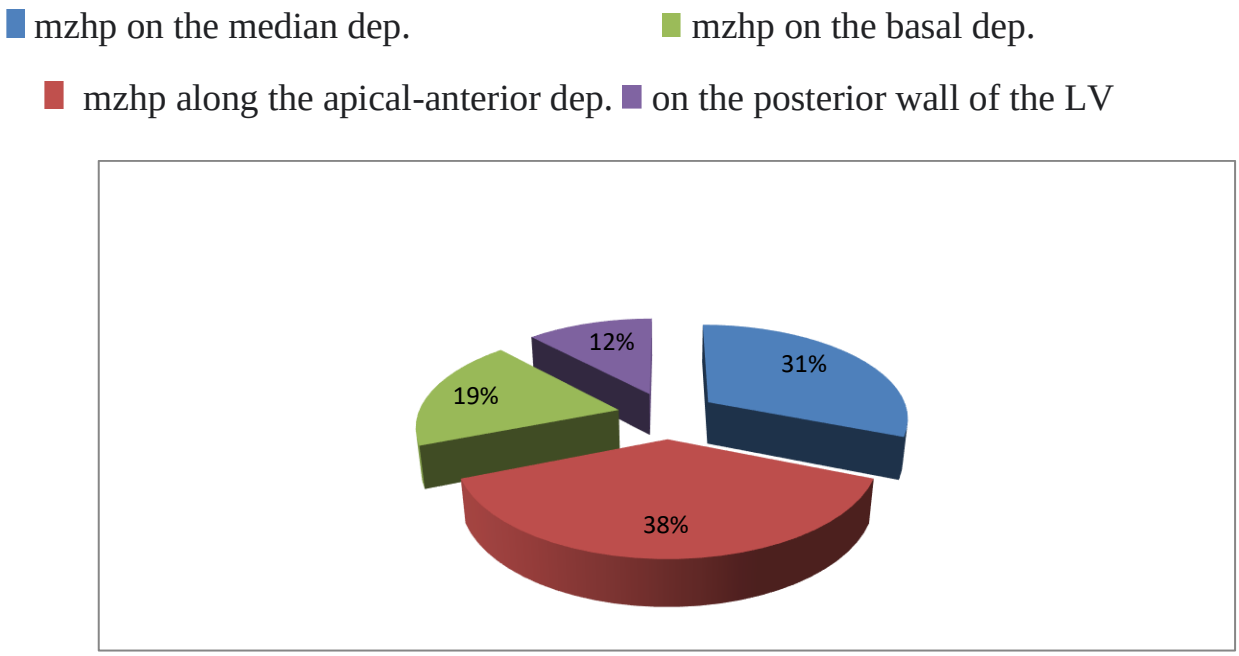
Table 1

Types of left ventricular remodeling

Gruppy	Kontsentricheskoye remodelirovaniye	Kontsentricheskaya gipertrofiya	Ekstsentricheskaya gipertrofiya	Normal'naya gipertrofiya
1.	22%	31%	31%	3%
2.	29%	39%	22%	5%

In the study of echocardiography, myocardial hypertrophy was often observed along the interventricular septum of the median from 1.09-1.12 cm - in 46 people (30.89%), basal 1.12-1.14 cm - in 28 people (18.79%), anterior-apical sections from 1.14-1.21 cm - in 58 people (38.92%), 1.21-1.3 cm along the interventricular septum and posterior wall - in 17 people. (11.41%).

Distribution of left ventricular myocardial hypertrophy by departments



In the group of patients with essential hypertension and cardiac arrhythmias, persons with concentric LV hypertrophy (39%) (n = 16) dominated, while concentric remodeling was observed in 29.3% (n = 12). Eccentric hypertrophy 21.9% (n = 9).

In the diagnosis of left ventricular hypertrophy (LVH) in patients with arterial hypertension (AH), the main method today is echocardiography (EchoCG). The role of electrocardiography (ECG) has recently diminished somewhat.

Table 2

Echocardiography indices in examined persons

indicators	1-group GB without LVH		2-group GB without LVH	
	without heart rhythm disturbance	With heart rhythm disturbance	without heart rhythm disturbance	with heart rhythm disturbance
МЖП, мм	10,03±1,11	11,05±1,21	10,20±2,83	11,22±2,33
ЗС ЛЖ, мм	9,34±2,21	10,32±2,26	11,02±1,85	12,29±2,65
Volume ЛП (мл)	34,11±12,54	41,71±14,65	42,66±12,21	46,78±13,32
ФВ ЛЖ, %	60,25±5,37	58,56±5,32	56,63±5,18*	56,56±5,28*
ММЛЖ (В-режим), г	187,13±16,26	195,26±15,19	195,37±15,28**	201,11±14,12**
ИММЛЖ, г/м^2	93,29±5,71	95,23±5,64	134,15±6,55**	138,12±6,35**

Note: * p <0.05, ** p <0.05 significance of differences between groups

However, due to its general availability, technological simplicity, speed of obtaining information and the possibility of a parallel assessment of the state of coronary circulation, this method cannot be “put aside”.

Table 3

Hemodynamic parameters of the left ventricle and left atrium

indicators	1 group GB without DD	2group GB with LDD
Ages, years	29,50±6,28	38,95±7,15
Males/Females	43(21/22)	62(37/25)
Office systolic blood pressure, mm Hg	125,19±5,11	134,32±6,35
Office diastolic blood pressure, mm Hg	77,82±6,16	84,12±5,18
Duration of hypertension	2,47±1,19	2,52±1,62
MVP, mm	10,59±1,23	11,24±1,34
ZC LV, mm	10,05±1,33	11,13±1,78
DAC, mm	30,14±5,40	35,15±5,34
KDR, mm	50,21±3,34	53,43±4,29
BWD, ml	118,02±12,73	145,23±10,64
CSR, ml	32,71±15,79	63,79±17,41
LP volume (ml)	*33,32±2,23*	*41,910±3,54**
LP dimensions (mm)	*40,62±3,31*	*43,211±3,61**
LVEF,%	55,26±5,37	51,47±5,28
LVMM (B-mode), g	175,14±4,47	235,12±4,13**
LVMI, g / m2	98,31±9,12	128,13±7,55**

Note: * p <0.05, ** p <0.05 significance of differences between groups

BP c-systolic blood pressure

BP d - diastolic blood pressure

IVS - interventricular septum

LA - left atrium

ALP - left atrial volume

ZS LV - posterior wall of the left ventricle.

EAD / EAD - end systolic / diastolic dimension.

CSR / EDV - end systolic / diastolic volume.

LVEF - left ventricular ejection fraction.

LVMI - left ventricular myocardial mass index.

It turned out that the LVMM index in the examined patients ranged from 98.6 to 175.13 g / m2 (the norm and up to 110 g / m2 in women and 130 g / m2 in men). In 38% of cases, this indicator exceeded the standard values. The maximum excess was 63%. At the same time, in 48% of cases an excess of the thickness of the apical and proximal part of the interventricular septum was found, and in 32% of cases there was hypertrophy of the posterior wall.

In our studies, according to echocardiography data, significant changes were only in EDV, EF, LVMM and LVMI. Indices of EDV by 9%, LVM by 34% and LVMI by 71% were higher in the group of patients with hypertension and heart rhythm disturbances, LV ejection fraction was 9% lower in relation to patients with AH without cardiac rhythm disturbances.

Conclusions

Thus, heart damage in hypertensive disease is manifested not only by morph functional remodelling of the left ventricle, but also by changes in the electrophysiological properties of cardiomyocytes. The defining condition for the occurrence of cardiac arrhythmias is the presence of structural heart disease, which turns into an unstable substrate under the influence of various exo- and endogenous functional factors. Essential hypertension is a significant, potentially modifiable risk factor for cardiac arrhythmias leading to remodelling "stunning" - stunning left atrial myocardium.

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