



CHANGES IN THE DIASTOLIC FUNCTION OF THE RIGHT VENTRICLE IN ARTERIAL HYPERTENSION

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Annotation

To study the diastolic function of the right ventricle in pain - governmental with different stages of hypertension and pris - union of heart failure ii-iii functional class.

Keywords: Hypertension, arterial hypertension, diastolic dysfunction, right ventricle, echocardiography

Introduction

Hypertension (HD) is currently one of the most pressing medical problems. It is more due to the fact that hypertension, largely determine you cardiovascular morbidity, disability and mortality, as well as characterize - camping prevalence [1,2].

A significant factor worsening the course and prognosis of hypertension remains myocardial remodeling. While remodeling of the left ventricle (LV) at GB studied quite well, of the right ventricle at GB was given considerable - less attention. Violations diastolic function of the right ventricle in pain - GOVERNMENTAL heart failure (HF) is an independent predictor of survival - STI and the use of tissue Doppler reveals new informative parameters of diastolic dysfunction (DD), and also to prove its connection with the development of pulmonary hypertension [1,2,3].

Despite the proven opinion of an increased risk of death from cardiovascular disease with a combination of heart failure - Nosta (CH) and hypertension, myocardial remodeling at GB on a background of connecting - Nenita CH also insufficiently studied. Adaptive processes in the heart during the development of HF against the background of long-term hypertension have their own characteristics, manifested in impaired right ventricular (RV) DD. Early diagnosis of changes in the heart of the GB is of great practical interest, that allows you to receive timely profligacy measures and provide treatment. Typically, when AG is primarily and mostly affected LV to it at the outset of the disease falls main load [3,4,5] It should be noted that the diastolic function, being complicated. - processes, the composed of multiple,





inter - connected factors depends on such indicators as: age, sex, body surface area, breathing phase, ventricular myocardial mass, heart rate, pre- and afterload. With the help of various research methods, it has been established that the pancreas with hypertrophy also undergoes hypertrophy, impairments of its contractility and clinically severe insufficiency develop. [4,6,7]

Objective

To study the diastolic function of the right ventricle in pain - GOVERNMENTAL with different stages of hypertension and Pris - union of heart failure II-III functional class.

Materials and Research Methods

We have examined 71 patients were subjected GB. Vase obsledovannye comprehensive survey in order to eliminate - Nia symptomatic hypertension and other diseases. Diagnosis GB put on Ba - Vania criteria proposed by the committee of experts VOZ.V study included patients with EH II-III stages - 31 women (43.66%) and 40 men (56.3%) (aged 25 to 63 years old) ... The average age in the group was 50.3 ± 4.6 years. For men, the average age was 43.4 ± 4.9 years and for women 52.7 ± 4.9 years. Antihypertensive pre - Paratov canceled 24 hours before the start of the study.

Electrocardiographic examination was conducted in about 12 - saccharinity leads to a speed of 50 mm / sec.

Blood pressure measurement is carried out after at least 5 minutes of rest Paci - Enta. Blood pressure was measured on the right brachial artery using the Korotkov method. Stage II hypertension was diagnosed in 46 patients. The average age of the patients was 42.3 ± 4.2 years. Of these, 21 women (mean age $44,7 \pm 4,7$ years) and 25 men (mean age $37,4 \pm 4,7$ years) .From the study were excluded patients with diseases strongly effects on systolic and diastolic function of great - Vågã ventricle, such as - diabetes, obesity, chronic nonspecific lung disease, trikuspidalnayaregurgitatsiya more than II degree, tachycardia with a heart rate over 100 beats per minute and atrial fibrillation

Results and Discussion

All patients showed signs of left ventricular hypertrophy in the presence of ECG and gipertonichetion angioretinopatii esthetic. Diagnose GB stage III has been set at the 25 patients having on - expressions of target organs. The average age of the patients was 57.1 ± 4.3 years. Of these, 10 women (average age 55.9 ± 4.6 years) and 15 men (average age 62.4 ± 4.5 years). Of these 7 patients (2 men and 5 women, mean age



63.3 ± 4.7 years) had a history of transient - Suitable cerebrovascular accident, the remaining 18 (6 women and 12 men, mean age of 56,2 ± 5 3 years) - documented ischemic heart disease. By sex and age group of patients GB II and III stages Dost - not true replicases. Secretaries GB and coronary heart disease was observed in 10 pain - GOVERNMENTAL GB stage II (21.7%) (2 females and 8 males, mean age 54.3 ± 2 , 6 years) and in 15 patients with stage III hypertension (60%) (7 women and 8 men, mean age 61.2 ± 7.3 years). The diagnosis of coronary heart disease in patients with hypertension was made according to the criteria recommended by WHO [2] ..in the group of patients included in the study, duration - telnost GB was 13,4 ± 3,2 years, long-term stability - the first increase in blood pressure was - 9.7 ± 3,8let. In 38obsledovannyh patients (53, 5%) revealed complaints of goals - nye pain on golovokru - voltage complained 21 bolnoy29,5%), pain in the left half of the thorax were observed in 30 patients (42.2%). The severity of heart failure in patients with various stages of hypertension is shown in Table 1.

Table 1 .The severity of heart failure in hypertensive patients

	SNFK ₁	SNFK _{II}	SN FC III	SN FC IV
GB stage II	20	24	2	-
Stage III GB	2	13	10	-

The distribution of patients by age and the severity of heart failure - the accuracy is shown in Table 2.

Table 2.Distribution of patients by age and severity of heart failure.

Patient age	Less than 39	40-49	50-59	60-69	Total
Number of patients	ten	33	eighteen	ten	71
SNFK _I	eight	ten	2	2	22
SN FK _{II}	2	22	4	1	37
SN FC III	-	1	-	7	12
SN FC IV	-	-	-	-	0

Among the examined patients included in the study, the labile course of the disease was noted in 7 (9.8%), stable blood pressure values - in 64 (90.1%) patients.

According to the "Recommendations of the WHO Committee of Experts" [1,2], the examination included patients with mild, moderate and high arterial hypertension. Patients with a mild form of increased blood pressure were 25 (35.2%), with a moderate form - 37 (52.1%) and high arterial hypertension - 9 patients (12.7%).



An objective clinical study in 26 patients (36.6%) revealed the expansion of the boundaries of the relative dullness of the heart to the left. And in almost all examined patients during auscultation, an accent of the second tone was heard with the aorta in patients with stage III hypertension, a tendency towards a decrease in the right ventricular ejection fraction (EF) was determined. Other clinical parameters between subgroups practically not different. Comparative clinical characteristics of patients, depending on the degree of rise in diastolic blood pressure reflected in Table 3. The systolic function of the right ventricle is essential - but did not differ between the groups.

Table 5. Clinical characteristics of patients with varying degrees beneath - EMA diastolic blood pressure

	Soft (n = 25)	Moderate (n = 37)	High (n = 9)
Patient age	63.3 ± 5.3	65.3 ± 12.3	68.4 ± 13.7
Duration of existing illness	13.8 ± 6.5	14.7 ± 3.6	15.8 ± 7.8
The duration of a hundred - a hammer flow	9.7 ± 4.5	9.9 ± 5.6	10.2 ± 4.6
GARDEN	153.5 ± 8.7 **	168.6 ± 9.7	195.6 ± 9.4
DBP	98.6 ± 7.8 **	110.8 ± 4.7	195.8 ± 4.8
FC SN	1.9 ± 0.3	1.8 ± 0.3	2.0 ± 0.4
EF RV, %	55.4 ± 8.7	66.7 ± 10.8	58.5 ± 7.7
UO PZh, ml	62.1 ± 5.3	57.6 ± 4.7	53.3 ± 5.6

Note: * - reliable compared with patients with moderate hypertension; ** - significant compared with patients with high AH ($p < 0.05$).

Analysis of the parameters diastolic RV function was conducted in dependence - ing on the lifting DBP level between patients with mild and high hypertension. Thus we revealed significant differences, which are concerned with carrying the maximum filling rate (SIT) to the maximum ejection rate (ISI) with a tendency to increase the time phase of rapid filling phase contribution rapid filling (VFBN) in right ventricular diastole, which is caused by the initial signs of diastolic - tion dysfunction of the right ventricle with a decrease in MCH and a moderate increase in the contribution of right atrial systole (RAP) to right ventricular filling. For the rest of the parameters, the differences were statistically insignificant (Table 6).



Indicators relaxing and filling RV between patients with mild and moderate increases in blood pressure were not significantly different than patients with moderate increase in diastolic AD. Pri analysis of diastolic function in dependence of the right ventricle - ing on the stage of hypertension following parameters were identified (Table 7) .Dostovernye differences between subgroups of patients with gipertoniche - tion ratio disease concerned only PSI / ISI is substantially reduced when GB step II.

Table 6. Indicators of diastolic function of the right ventricle in patients with varying degrees of rise in diastolic blood pressure.

	Soft (n = 25)	Moderate (n = 37)	High (n = 9)
MSN, ml / sec	280.8 ± 12.7	300.6 ± 15.8	299.7 ± 17.6
MSI, ml / sec	300.5 ± 13.6	301.4 ± 13.7	298.6 ± 10.7
VSMN, ms	334.3 ± 35.8	320.7 ± 36.9	321.9 ± 34.9
VSMI, msec	140.4 ± 18.9	144.7 ± 11.6	140.8 ± 18.8
BCMh / RR%	34.4 ± 14.8	37.7 ± 11.9	36.8 ± 15.7
VSMN / D,%	35.3 ± 15.5	35.6 ± 12.6	35.5 ± 14.6
MSN / MSI, units	0.84 ± 0.08 *	0.96 ± 0.08	0.95 ± 0.06
B1 / 3,%	15.3 ± 8.6	15.6 ± 6.6	16.6 ± 9.6
WFBN,%	42.5 ± 6.9	32.7 ± 6.8	35.6 ± 7.5
VSPP,%	15.9 ± 5.8	14.8 ± 6.6	14.7 ± 4.8
KDO PZh, ml	125.5 ± 9.7	127.9 ± 8.9	135.8 ± 8.8

Note: * - reliably with patients with moderate AH and high AH (P < 0.02).

Table 7. Diastolic function of the right ventricle at the time - the personal stages of hypertension.

	GB II Art (n = 46)	GBIII article (n = 25)	Control group
MSN, ml / sec	300.3 ± 14.6	340.7 ± 15.8	302.4 ± 15.8
MSI, ml / sec	314.7 ± 135	300.5 ± 11.2	302.5 ± 14.2
VSMN, ms	330.3 ± 42.6	189.9 ± 36.8	320.5 ± 15.6
VSMI, msec	314.7 ± 13.5	143.5 ± 13.7	147.7 ± 8.6
BCMh / RR,%	330.3 ± 42.7	42.7 ± 11.8	20.8 ± 16.7
VSMN / D,%	138.5 ± 14.7	41.4 ± 12.3	25.5 ± 15.6
MSN / MSI, units	24.3 ± 13.8	1.04 ± 0.04	0.93 ± 0.03
B1 / 3,%	24.3 ± 147	23.7 ± 8.4	18.6 ± 10.6
WFBN,%	0.88 ± 0.08 *	40.6 ± 6.4	40.6 ± 64
VSPP,%	15.3 ± 8.6	14.7 ± 6.7	12.7 ± 3.7
KDO PZh, ml	37.5 ± 8.7	135.8 ± 9.9	125.6 ± 5.8
UO PZh, ml	13.5 ± 7.8	46.7 ± 5.7	52.3 ± 4.7



Note: * - reliable in comparison with the group of GB III Art. ($p < 0.05$).

Upon further study of diastolic function in patients with hypertensive disease II stage revealed that 31 patients (40.8%) had "pseudonormal" type diastolic at - Rushen consists in approaching the regulatory pokazatelyammaksimalnoy filling speed, as well as normalization of ICI contribution - toly atrium (Table 8).

Table 8. Indicators of diastolic function of the right ventricle in patients with stage II essential hypertension, depending on the type of diastole disorders .

Index	Moderate - Rushen relax - Lenia (n = 15)	Pseudonormal type (n = 31)	Control
MSI, ml / sec	300.8 + 12.5 *	295.9 ± 12.5	302.5 + 14.1
MSN, ml / sec	190.4 ± 13.6 **	300.3 ± 12.3	302.4 ± 15.8
VSMI, msec	145.7 ± 6.9	144.6 + 4.9	147.7 ± 8.9
VSMN, ms	323.4 ± 12.6	317.3 ± 13.7	320.5 + 15.6
VSMN / D,%	24.5 ± 14.5	25.7 ± 14.6	25.5 ± 15.6
VSMNLSH,%	19.8 ± 15.6	19.5 ± 14.5	20.8 ± 16.7
MSN / MSI, units	0.73 ± 0.06 **	0.94 + 0.06	0.93 ± 0.03
B1 / 3,%	16.8 ± 9.8	8.3 ± 4.4	18.3 ± 6.2
WFBN,%	41.5 ± 4.5	42.6 ± 7.3	40.6 + 6.5
VSPP,%	14.4 ± 5.8	11.3 ± 4.9	12.7 ± 3.8
KDO PZh, ml	128.7 ± 9.8	124.8 ± 8.8	125.6 ± 5.8
EDV LV, ml	55.6 ± 6.4	53.6 ± 5.4	52.3 + 4.7

Note: * - significant compared with the control ($p < 0.05$), * - significant compared with the pseudo-normal type.

Thus, LV diastolic function depends on blood pressure and / or the presence of myocardial hypertrophy - yes, but also on the neurohumoral changes which are characteristic for - initial stage GB. Identified data show the processes of myocardial hypertrophy is not only the left but also the right zheludochka. Razvitie diastolic violations of the right ventricular - ka begins with the reduction of the maximum filling speed and compen - Sathorn increased pressure in the right atrium. These disorders are significant in comparison with the pseudo-normal type of diastolic dysfunction. Significant nature of these changes and the relatively high number of patients with this type of diastolic on - Rushen among patients with Stage II EAH cause downward trend in MCH at Stage II EAH, which led to a significant reduction of PSI / ISI index in these patients.



Pseudonormal type of pancreatic dysfunction associated with an increase MSN. Uveliche - of the SIT is compensatory in nature, allowing to overcome the rigidity of the right ventricle. In addition, this type of diastema - netocrystalline dysfunction was associated with a shortening of the time of isovolumic races - slableniya (IVRT) .If the development stage III GB celebrated sous - nificant prevalence of patsientovs restrictive type of diastolic abnormalities (Table 9). Thus otmechalosuvelichenie maximum MSE e - grow filling and decline in sokratitel - hydrochloric sposobnostipravogo zheludochka. Indeks PSI / ISI. significantly increased. Patients gipertoniche - tion stage III disease formation restrictive type diastolic narusheniyvliyalo and temporal parameters dia - stoly. Naprimen, reveal a tendency to increase the time of maximum speed filling and ejection.

Table 9. Right ventricular diastolic function in patients with essential hypertension stage III, depending on the type of Naru - solutions of diastole

	Pseudonormal type (n = 4)	Restrictive type (n = 21)	Control
MSI, ml / sec	296.8 + 13.5	167.5 + 13.5 *	302.5 + 14.1
MSN, ml / sec	302.4 ± 19.3	335.3 ± 15.2 *	302.4 + 15.8
BCMh / RR,%	19.6 ± 13.3	24.6 + 14.8	20.8 ± 16.7
VSMI, msec	144.6 + 7.9	154.4 ± 8.4	147.7 + 8.9
VSMN, ms	318.4 ± 13.6	330.5 ± 14.8	320.5 ± 15.5
VSMN / D,%	25.6 ± 17.7	30.9 + 13.8	25.5 ± 15.6
MSN / MSI, units	0.96 ± 0.08	1.13 ± 0.05 *	0.93 ± 0.03
B1 / 3,%	8.5 ± 4.6	19.8 ± 8.7	18.6 + 6.3
WFBN,%	41.5 ± 8.4	41.7 + 5.4	40.6 ± 6.7
spp,%	12.5+ 9.8	16.8 ± 7.8	12.7 ± 3.8
KDO PZh, ml	124.8 ± 8.9	121.8 + 7.8	125.6 ± 5.8
UO PZh, ml	54.6 + 5.7	46.3 ± 6.8	52.3 ± 4.7

Note: * - significant compared to control ($p < 0.05$).

Index PSI / ISI is a measure of RV DD depending on the stage of hypertension - cal disease. Prevalence patsien - comrade hypertensive patients with stage III restrictive type disorders diastole resulted in a significant increase in the PSI / ISI Index, while patients GB II stage mentioned it decrease.

For patients with stage II hypertension, it was 1.54 ± 0.5 , and for patients with stage III hypertension - 2.6 ± 0.4 . No significant differences in blood insufficiency step - circulation was not obtained between the groups, but in order to minimize the effect on the developing heart failure viewed indicators further analysis on diastolic - Rushen be held in each subgroup separately.



Conclusions

Thus, the accession of heart failure - STI patients at different stages of hypertension developed more severe DD RV, in some cases the nature of a restrictive nature. In patients with severe heart failure revealed a decrease contractility of the right ventricle, which is the dos - tovernom, reduced ISI, the trend to a reduction - zheniyu vivo and increased RV EDV.

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