Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Features of diastolic dysfunction of the right ventricle in patients with hypertonic disease

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ABSTRACT:
Hypertension is an urgent medical problem. As a result of the development of arterial hypertension, myocardial remodeling develops. Remodeling of the heart is a significant factor that, in turn, worsens the course and prognosis of the disease. The remodeling of the left ventricle in atheral hypertension has been studied quite well, but the state of the right ventricle has received much less attention. Right ventricular diastolic dysfunction is an independent predictor of survival. We studied the diastolic function of the right ventricle in 71 patients with various stages of hypertension and with concomitant heart failure of II-III functional classes. When analyzing the diastolic parameters of the right ventricle, depending on the level of elevation of diastolic blood pressure, significant differences were found between patients with mild and high arterial hypertension and related to the ratio of the maximum filling rate to the maximum expulsion rate with a tendency to increase the time of the rapid filling phase in diastole right ventricle, which is due to the initial signs of diastolic dysfunction of the right ventricle with a decrease in the maximum filling rate and a moderate increase in the contribution of right atrial systole to filling the right ventricle. A definite tendency towards a decrease in the ejection fraction of the right ventricle in patients with stage III hypertension was revealed; other clinical indicators between the subgroups practically did not differ. We have studied the parameters of the diastolic function of the right ventricle at different stages of hypertension, depending on the type of diastole disorders and low-symptom and severe heart failure. The addition of severe heart failure at various stages of hypertension leads to the appearance of more severe types of diastolic dysfunction of the right ventricle, which in some cases are restrictive. For patients with severe heart failure, a decrease in the contractility of the right ventricle is characteristic, which consists in a reliable, compared with control, a decrease in the maximum expulsion rate, a tendency to a decrease in the stroke volume and an increase in the end-diastolic volume of the right ventricle.
KEY WORDS: essential hypertension, right ventricle, diastolic function, heart failure, echocardiography.

Received: 28/06/2020 **Modified:** 27/08/2020 **Accepted:** 26/08/2020

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This article may be cited as: Yarmukhamedova S, Nazarov F, Mahmudova X, Vafoeva N, Bekmuradova M, Gaffarov X, Toirov D, Normatov M, Yarmatov S, Xusainova M. Features of diastolic dysfunction of the right ventricle in patients with hypertonic disease. J Adv Med Dent Scie Res 2020;8(9):74-77.

INTRODUCTION

Arterial hypertension remains one of the most pressing medical problems. This is due to the fact that arterial hypertension, which is largely responsible for high cardiovascular morbidity and mortality, is characterized by widespread prevalence and, at the same time, lack of adequate control in the population. [1,2]

Myocardial remodeling is a significant factor that worsens the course and prognosis of the disease. While the remodeling of the left ventricle in hypertension has been studied rather well, the state of the right ventricle in hypertension has received much less attention. Violations of the diastolic function of the right ventricle in patients with heart failure are an independent prognostic factor for survival, and the use of pulsating tissue Doppler studies reveals informative parameters of diastolic dysfunction, to prove its relationship with the development of pulmonary hypertension [3,4,5].

Despite the proven position of an increase in the risk of death from cardiovascular diseases with a combination of heart failure and atrerial hypertension, myocardial remodeling in hypertension against the background of HF attachment has also not been studied. Undoubtedly, the adaptive processes in the myocardium during the development of HF against the background of long-term hypertension have their own characteristics, manifested, among other things, in violations of the diastolic function of the right ventricle. Early diagnosis of changes in the heart in GB is of great practical interest, which allows taking timely preventive measures and treatment. [5,6] As a rule, in arterial hypertension, the left ventricle of the heart is primarily and to a greater extent affected, on which the load falls from the very beginning of the disease. It should be noted that the diastolic function, being a complex integral process consisting of numerous interrelated factors, depends on the influence of various conditions: age, sex, body surface area, respiratory phases, myocardial mass, heart rate , content of hematocrit, conditions of pre- and afterload. [6, 7,8.9] The defeat of the right ventricle, hemodynamically not directly overloaded, has not attracted the attention of researchers for a long time. [10,11,12] At the same time, it has long been established with the help of various research methods that the right ventricle in one of the most frequent variants of arterial hypertension - hypertension - it undergoes hypertrophy, impairments of its contractility and clinically severe insufficiency develop. [13,14, 15]

Purpose of the study: To study the diastolic function of the right ventricle in patients with various stages of hypertension and with concomitant heart failure of II-III functional classes.

MATERIALS AND METHODS

71 patients with hypertension were examined.

All patients underwent a comprehensive examination in order to exclude the symptomatic nature of arterial hypertension and identify other diseases. The diagnosis of hypertension was made on the basis of the criteria proposed by the WHO expert committee.

The study included patients with hypertension II-III stages - 32 women (45.1%) and 39 men (54.9%) (aged 24 to 63 years). The average age in the group was 50.3 ± 4.4 years. For men, the average age was 43.3 ± 4.9 years and for women 52.6 ± 4.9 years. Antihypertensive drugs were discontinued at least 24 hours before the study.

Electrocardiographic examination was carried out in 12 conventional leads at a speed of 50 mm / sec.

Blood pressure was measured after at least 5 minutes of patient rest. Blood pressure was measured on the right brachial artery using the Korotkov method. The diagnosis of stage II hypertension was established in 46 patients. The average age of the patients was 42.3 ± 4.2 years. Of these, 22 women (average age 44.7 ± 4.7 years) and 24 men (average age 37.4 ± 4.7 years).

RESULTS AND DISCUSSION

All patients showed signs of left ventricular hypertrophy on the ECG (according to the criteria of Sv1 + Ky5> 35 mm), hypertensive angioretinopathy. Stage III hypertension was diagnosed in 25 patients with lesions of target organs. The average age of the patients was 57.1 ± 4.4 years. Of these, 10 women (average age 55.9 ± 4.7 years) and 15 men (average age 62.4 ± 4.6 years). Of these, 7 patients (3 women and 4 men, average age 63.3 ± 4.6 years) had a history of transient cerebrovascular accidents, the remaining 18 (7 women and 11 men, average age 56.3 ± 5 , 4 years) - ischemic heart disease is documented. There were no significant differences in gender and age in the groups of patients with hypertensive disease of stages II and III. The combination of hypertension and coronary heart disease was noted in 10 patients with hypertension stage II (21.7%) (3 women and 7 men, average age 54.3 ± 2.7 years) and in 15 patients with stage III hypertension (60%) (8 women and 7 men, average age 61.3 ± 7.4 years).

The diagnosis of coronary heart disease in hypertensive patients was made according to the criteria recommended by the WHO. [11] Patients with diseases that significantly affect the systolic and diastolic function of the right ventricle - diabetes mellitus, obesity, chronic nonspecific lung diseases, tricuspid insufficiency more than II degree, due to the fact that retrograde blood flow distorts the characteristics of the diastolic function of the right ventricle, tachycardia with a heart rate of more than 100 beats per minute and atrial fibrillation.

Diseases of the bronchopulmonary system were excluded in all patients by history, clinical, and radiological examination.

In the group of patients included in the study, the average duration of the disease was 13.4 ± 3.4 years, the duration of a stable increase in blood pressure was 9.7 ± 3.6 years. Relatives had indications of arterial hypertension in 57 patients (80.2%).

The clinical picture of the disease was dominated by complaints of headaches, the presence of which was noted in 37 patients (52.3%), dizziness disturbed 22 patients (31%), pain in the left half of the chest was observed in 32 patients (42.3 %). Most of the patients had prolonged pain, described as stitching, with no clear connection with exercise. 20 patients with stage II hypertensive disease had signs of functional class I heart failure, 24 patients - functional class II, III functional class of heart failure was detected in 2 patients.

In patients with stage III hypertensive disease, heart failure of functional class I was expressed in 2, functional class II in 13 patients, and functional class III in 10 patients with stage III hypertension.

Among the patients included in the study, the labile course of the disease was observed in 8 (11.3%), stable numbers - in 63 (88.7%) patients.
According to the "Recommendations of the WHO Committee of Experts", at the initial examination, patients with mild, moderate and high arterial hypertension (diastolic blood pressure 95-104 mm Hg; 105-114 mm Hg and more than 115 mm Hg) were identified. Art.). There were 25 patients with a mild form of increased blood pressure (35.2%), with a moderate form - 37 (52.1%) and high arterial hypertension - 9 patients (12.7%).
On objective examination, the expansion of the boundaries of relative cardiac dullness was noted in 25 patients (35.2%), practically all patients had an accent of the II tone in the II intercostal space to the left of the sternum.
X-ray of the chest organs did not reveal any respiratory pathology in any patient; enlargement of the left border of the heart was revealed in 35 patients (49.3%).
Attention is drawn to a certain tendency towards a decrease in the ejection fraction of the right ventricle in patients with stage III hypertension; other clinical indicators between the subgroups practically did not differ. Comparative clinical characteristics of patients depending on the degree of rise in diastolic blood pressure are shown in Table 1.

When analyzing the diastolic parameters of the right ventricle, depending on the level of rise in diastolic blood pressure, significant differences were found between patients with mild and high arterial hypertension and related to the ratio of the maximum filling rate to the maximum expulsion rate ($p < 0.02$) with a tendency to an increase in the time of the fast filling phase in the diastole of the right ventricle, which is due to the initial signs of diastolic dysfunction of the right ventricle with a decrease in the maximum filling rate and a moderate increase in the contribution of right atrial systole to filling the right ventricle.
For the rest of the indicators, the differences turned out to be statistically unreliable. Noteworthy is the absence of differences in the indices of relaxation and filling of the right ventricle between patients with mild and moderate increases in blood pressure, except for a tendency to increase the hemodynamic contribution of right atrial systole in patients with a moderate increase in diastolic blood pressure.
When analyzing the diastolic function of the right ventricle, depending on the stage of hypertension, the following was revealed. Significant differences between the subgroups of patients with essential hypertension concerned only the ratio of the maximum filling rate to the maximum expulsion rate, which significantly decreased in stage II hypertension.
With the development of severe heart failure, the integrative indicator of the ratio of the maximum filling rate to the maximum expulsion rate approached the values corresponding to the control values, however, upon careful analysis of these data, it turned out that not only the maximum expulsion rate, but also the maximum filling rate decreased in patients which reflected the addition of systolic dysfunction to diastolic disorders.

CONCLUSION

Thus, the addition of severe cardiac insufficiency at various stages of hypertension leads to the appearance of more severe types of diastolic dysfunction of the right ventricle, which in some cases are restrictive in nature. For patients with severe heart failure, a decrease in the contractility of the right ventricle is characteristic, which consists in a reliable, compared with control, a decrease in the maximum rate of expulsion, a tendency to a decrease in the stroke volume and an increase in the end-diastolic volume of the right ventricle.

Table 1. Indicators of right ventricular systolic function did not differ significantly between the subgroups. Clinical characteristics of patients with varying degrees of rise in the level of diastolic blood pressure

	Mild (n=25)	Moderate (n=37)	High (n=9)
Age	63,3± 5,2	65,3± 12,2	68,4± 13,6
Duration of illness	13,8+6,4	14,7 ±3,7	15,8±7,8
Duration of stable flow	9,7±4,5	9,9±5,7	10,2±4,7
Systolic blood pressure	153,5±8,7**	168,6±9,7	195,6±9,7
Diastolic blood pressure	98,6+7,8**	110,8±4,9	195,8±4,9
Heart failure functional class	1,9±0,4	1,8±0,3	2,0±0,4
Right ventricular ejection fraction,%	55,4±8,9	66,7±10,9	58,5±7,8
Stroke volume of the right ventricle, ml	62,1±5,4	57,6±4,9	53,3±5,5

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

ACKNOWLEDGEMENTS
We are grateful to the staff members of Samarkand State Medical Institute for the cooperation and support in our research. The participants kindly gave full written permission for this report.

CONSENT
Written informed consent was obtained from all participants of the research for publication of this paper and any accompanying information related to this study.

CONFLICT OF INTEREST
The authors declare that they have no competing interests.

FUNDING
No funding sources to declare.

REFERENCES
1. WHO On the road to recovery European strategy for the prevention and control of noncommunicable diseases. WHO European Bureau
2. SHkola zdorov'ya Arterial'naya gipertoniya Rukovodstvo dlya vrachej pod red R.G.Oganova M GEOTAR Media
3. YArmuhamedova S. H., Bekmuradova M. S. Razvitie serdechnoj nedostatochnosti u bol'nyh s gipertonicheskoj bolezn'yu po pokazatelyam natrijureticheskogo peptida //Evrazijskij kardiologicheskij zhurnal. – 2019. – №. S2. – S. 283-284.
4. Mazur V.V., Kalinkin A.M. ZamoraevO.A. Remodelirovanie serdca u bol'nyh postinfarktnym kardiosklerozom na raznyh stadyah hronicheskoj serdechnoj nedostatochnosti. Rossijskij kadiologicheskij zhurnal №3 (71) 2008.
5. Bekmuradova M. S., Gafforov H. H., YArmatov S. T. Znachenie opredeleniya mozgovogo natrijureticheskogo peptida v processe diagnostiki hronicheskoj serdechnoj nedostatochnosti //Dostizheniya nauki i obrazovaniya. – 2020. – №. 4 (58).
6. Teregulov YU.E. Masyanskaya S.D., Laipova Z.L. Ocenka pokazatelej gemodinamiki u bol'nyh arterial'noj gipertenziej pri razlichnyh tipah remodelirovaniya levogo zheludochka. Prakticheskaya medicina 6(82)
7. YArmuhamedova S. H., Kamolova D. ZH. Izuchenie geometrii miokarda u bol'nyh gipertonicheskoj bolezn'yu po dannym ekhokardiografii //Dostizheniya nauki i obrazovaniya. – 2019. – №. 12 (53).
8. Vasyuk YU.A., Hadgezova A.B., Ivanova S.V. i dr.// Serdechnaya nedostatochnost'. 2005. T.6.№3 (31)
9. Cittadini A., Fazio S., Stromer H.et al.// Am.Heart J. 1995. V.130 (50).P. 1074-1082.
10. Rubanova M.P., Veber V.R., ZHmajlova S.V., Kopina M.N. Diastolicheskaya disfunkciya levogo i pravogo zheludochka u bol'nyh arterial'noj gipertoniej i vozmozhnosti ee korrekcii.Serdechnaya nedostatochnost'. 2005-№3.
11. G. SHahnovich, A.I. Zaharova, D.V. CHerkashin, A.S. Svistov,K.S. SHulenin, K.N. Tkachenko, A.E. Alanichev, R.G. Makiev,G.G. Kutelev, S.V. Efimov Diastolicheskaya disfunkciya miokarda: ekhokardiograficheskij fenomen ili vid serdechnoj nedostatochnosti?
12. Klinicheskie issledovaniya. Vestnik Rossijskoj voenno-medicinskoj akdemii 3(51) – 2015.
13. YArmuhamedova S. H., Bekmuradova M. S., Nazarov F. YU. Znachenie urovnya mozgovogo natrijureticheskogo peptida v rannej diagnostike hronicheskoj serdechnoj nedostatochnosti u bol'nyh s arterial'noj gipertoniej //Dostizheniya nauki i obrazovaniya. – 2020. – №. 4 (58).
14. Mineeva E.E. Gvozdenko T.A. Diagnostika diastolicheskoj disfunkcii na rannih stadiyah arterial'noj gipertenzii u lic molodogo vozrasta. – 2008. – № 1 – S. 105-106Ko
15. European Society of Cardiology (ESC) Recommendations for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 European Society of Cardiology (ESC) Working Group on the Diagnosis and Treatment of Acute and Chronic Heart Failure.