



Clinical-Functional Indicators of Heart Arrhythm Disorders in Climacteric Women

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Abstract: In menopausal women, there is a progressive decrease in the concentration of sex hormones and, as a result, cardiovascular diseases, in particular arterial hypertension, may appear.

Keywords: acute myocardial infarction, menopause, fractal analysis of cardiointerval variation.

Relevance

Along with complaints of pain in the region of the heart, interruptions and palpitations [10, 12]. However, as practice shows, recording an ECG in 12 leads does not allow registering cardiac arrhythmias and assessing their nature. Myocardial infarction is considered one of the most common manifestations of coronary heart disease (CHD) and one of the main causes of death in the population of developed countries [1]. The overall total mortality from acute myocardial infarction (AMI) of all patients is 25% [2]. It has been established that women with a preserved menstrual cycle develop coronary artery disease less frequently than men of the same age with similar risk factors [14, 2]. A number of authors believe that for the occurrence of coronary artery disease in women, a more intense exposure to a risk factor or a combination of several factors is required [4, 16, 13].

The epidemiological data of recent years indicate an increase in the incidence of AMI in young women, which makes the study of coronary artery disease in this group of patients important and relevant [5, 6].

The development and progression of acute myocardial infarction in women is characterized by an increase in the tension of higher autonomic centers, in which protective and adaptive reactions are characterized by a predominance of central influences over humoral, and sympathetic over parasympathetic ones, which is aggravated as the severity of acute myocardial infarction increases [1, 2, 8].

Currently, one of the most informative methods for quantitative assessment of the autonomic regulation of heart rate is the determination of heart rate variability (HRV), which is a reliable and independent prognostic indicator not only for cardiovascular diseases in menopausal women, but also for menopausal women. Other pathology [17].

This work is devoted to the analysis of the characteristics of the fractal indicator of HRV, which is regulated not only by the sympathetic and parasympathetic divisions of the autonomic nervous system (ANS), but also at the level of central extracardiac regulation (ECR), which can be used in the diagnosis of women with AMI in menopause. -ric period.

Purpose of the study

To study fractal analysis of cardiointerval variation in women with acute myocardial infarction in menopause.

Material and research methods

During 2021-2022, 195 women aged 45 to 60 who were hospitalized in the cardiology departments of the Bukhara Multidisciplinary Regional Hospital and the Republican Emergency Medical Center in Bukhara were examined. The examined women were divided into 4 groups: group 1 - 35 (17.9%) practically healthy women (PLW); group 2 - 45 (23.1%) women in menopause (GCP); group 3 - 65 (33.3%) women with acute myocardial infarction in menopause without complications; group 4 - 50 (25.7%) women with acute myocardial infarction in menopause with complications. Depending on the nature of the lesion and localization of myocardial infarction, 3 groups of women experienced acute myocardial infarction with ST segment elevation (AISTEMI) - 18 (27.7%), without ST segment elevation (STEMI)

- 32 (49.2%). From the point of view of topical diagnosis: AMI of the anterior wall in this group was observed in 42 (64.6%), posterior wall - in 8 (12.3%) women. In group 4, AMI with complications in terms of prevalence and topic was as follows: acute myocardial infarction with ST segment elevation (AMI ^ T)
- 23 (46%), without ST segment elevation (AMI-6OST) - 26 (52%), anterior wall - 36 (72%) and posterior wall - 14 (28%).

Isolation of the R-R sequence. and subsequent data processing was carried out by the digital method "online" on a computer program. To determine the normative values, a 10-minute ECG recording was performed with the application of electrodes according to the scheme of the first standard lead from registration and recording of R-R intervals. When analyzing the duration and nature of the R-R cardio interval and as a result of its computer processing, the following parameters were determined:

is the standard deviation of the R-R interval variations from the mean value (W_{av}) and $|3$ is the subordinated fractal estimate.

The results obtained were processed by difference, variational statistics with the calculation of $M \pm m$ and with the determination of the indicator of the statistical significance of differences (t). The difference was considered significant if the probability of a possible error, determined by the Student's table, was $p < 0.05$. Paired comparisons of absolute values were carried out using the Mann-Whitney U-test for comparing independent samples, the Wilcoxon T-test for comparing dependent samples.

Results and its discussion

When conducting a comparative assessment of the indicators of the structural and functional state of the heart according to the fractal analysis of the variation of the cardiointerval, we obtained the data shown in the table.

The analysis of the fractal assessment in the PLS of the 1st group revealed the stability of the ECR and indicators of the degree of integration of systemic connections that are formed from the CNS, which in our observations amounted to: the duration of the RR interval - 798.3 ± 14.80 ms, the variability of the oRR interval - 0.99 ± 0.01 and the degree of stability of heart rate regulation $p - 0.96 \pm 0.12$, which corresponds to the normative values

Indicators of the fractal assessment of HRV in women in menopause ($M \pm m$)

Options	Group 1 LLH n=35	Group 2 GSD n=45	Group 3 AMI without complications n=65	Group 4 AMI with complications n=50
RR, mc	$798,3 \pm 14,80$	$647,1 \pm 6,6$ -18,9 %***	$601,2 \pm 35,0$ -24,7 %*** 7,1 %	$469,1 \pm 36,1$ -41,3%*** 27,5 % 21,9 %
CTRR	$0,99 \pm 0,01$	$0,70 \pm 0,08$ -29,2%*	$0,42 \pm 0,07$ -57,5 %*** 40 %	$0,13 \pm 0,09$ -86,6 %*** 81,4% 69%

B	0,96±0,12	0,91±0,11 -5,3 %	0,55±0,07 -42,7% *** 39,55	0,15±0,06 -84,4% *** 83,5% 72,7%
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Note: * - $P < 0.05$; ** - $P < 0.01$; *** - $P < 0.001$; italics - % LLL to GI, AMI without donkey, AMI with donkey; bold type - % of GSD to AMI without os., AMI with os.; regular font - % MI without osl., to MI with osl.

In the analysis of indicators in the 2nd group of GSD, there is a slight sympathicotonia with a predominance of sympathetic innervation with a decrease in the degree of integration of systemic connections, in comparison with the indicators of the 1st group of LLJ. Revealed a significant decrease in RR by 18.9% ($p < 0.001$) characterized by a compensatory increase in heart rate during menopause; a decrease in the variability of the cardiointervaloRR by 29.2% ($p < 0.05$), which indicates a rigid rhythm and a decrease in the tone of stochastic regulation, reflecting the homeostatic process in the GSD; statistically unreliable decrease in the degree of stability of heart rate regulation p by 5.3%, which nevertheless characterizes the preservation of ECR from the side of the central nervous system in the climacteric period.

In group 3, in women with acute myocardial infarction without complications, statistical analysis revealed significant differences in RR, oRR and | ($p < 0.001$) and a downward trend of 7.1%; according to oRR - a significant decrease by 57.5% ($p < 0.001$) and by 40% ($p < 0.05$); for indicator |3 - a significant decrease by 42.7% ($p < 0.001$) and 39.5% ($p < 0.05$), respectively. The obtained data of the fractal assessment of the degree of integration of systemic connections in women with acute myocardial infarction without complications indicate a statistically significant violation of the ECR from the side of the central nervous system and HRV, which leads to significant sympathicotonia and a decrease in mean dynamic, systolic and diastolic blood pressure, tachycardia, impaired homeostatic processes of regulation of heart rate stability due to pronounced hormonal disorders, the influence of the hypothalamic-pituitary and limbic systems, as well as an increase in metabolism and endothelial dysfunction, which, in turn, with further imbalance, can lead to the development of cardiogenic shock and heart failure.

In the 4th group in women with AMI with complications, the analysis of the fractal assessment showed significant shifts in all three indicators, which indicate significant violations of extracardiac regulation, sympathicotonia, autonomic imbalance, compared with the indicators of women in the 3rd group of AMI without complications, GI and PZZH.

A significant decrease was found between the indicators of the 4th group, compared with the 1st, 2nd and 3rd groups: RR decreased by 41.3% ($p < 0.001$), by 27.5% ($p < 0.001$), as well as by 21.9% ($p < 0.05$), respectively, by groups; oRR - significantly reduced by 86.6% ($p < 0.001$), by 81.4% ($p < 0.001$) and by 69% ($p < 0.05$); there is also a significant decrease in the degree of stability of heart rate regulation p by 84.4% ($p < 0.001$), by 83.5% ($p < 0.001$) and by 72.7% ($p < 0.001$), respectively (Table). In women with acute myocardial infarction with complications, a significant decrease in the degree of stability of heart rate regulation is revealed due to violation of the ECR from the side of the central nervous system, an imbalance and direction of the vegetative shift to a pronounced predominance of sympathetic activation, located in the subcritical zone, which significantly exacerbates the course of the disease and its complications in 3-4 groups of women.

There is a slight sympathico-tonia with the preservation of the ECR from the side of the central nervous system, the integration of systemic connections in GERD, which adequately correlates with the adaptive load, reflecting the homeostatic process of regulating the stability of the heart rhythm. At the same time, heart rate variability is characterized by a compensatory mechanism for providing adaptive processes in the cardiovascular system of women to maintain homeostasis in the acute period of myocardial infarction.

In the climacteric period, in 3-4 groups of women with acute myocardial infarction without complications and with complications, pronounced violations of extracardiac regulation of the central nervous system, heart rate variability, metabolism and endothelial dysfunction with a

predominance of sympathetic activation are detected, which are statistically more significant in 4 group of women with acute myocardial infarction in menopause with complications.

Steady deviation from the normal regulation mode, rhythm variability towards low (ORR<N) or high (ORR>N) values, as well as pronounced disturbances in the integration of systemic connections β , which form the ECR from the CNS, can be considered as predictors of the development of cardiogenic shock, and also used to predict, determine the severity and effectiveness of therapy in women with acute myocardial infarction without complications and with complications.

Conclusion

Thus, according to the data of statistical indicators of power spectra obtained by us, the imbalance of heart rate variability in women with acute myocardial infarction in the menopause is considered one of the factors and predictors of the development of a lethal outcome. In practically healthy women, compared with groups 2, 3, 4, in general, the power spectrum corresponds to the normative values and the vegetative balance of healthy women. In the GKP, there is a slight sympathicotonia with a predominance of sympathetic innervation, with a decrease in the degree of integration of systemic connections, compared with the parameters of the LLJ, i.e. the norm. According to fractal assessments, there is a statistically significant decrease in the parameters of RR, ORR and β in women with AMI without complications, compared with the data of groups 1 and 2, the following were revealed: sympathicotonia, a decrease in mean dynamic, systolic and diastolic blood pressure, and also increased metabolism and endothelial dysfunction with the development of complications. Significant shifts in all three indicators obtained by analyzing the fractal assessment are observed in women with AMI with complications, which indicate significant violations of extracardiac regulation, sympathicotonia, autonomic imbalance, compared with the indicators of women with AMI without complications, which is clinically expressed the appearance of complications in the form of the development of cardiogenic shock, heart failure and arrhythmias.

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