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FEATURES OF ELECTRO- AND ECHOCARDIOGRAPHIC MANIFESTATIONS OF LEFT VENTRICULAR HYPERTROPHY, AGE ASPECTS

Rusnak I.T., Tashchuk V.K., Akentyev S.O.

Kulachek V.T., Kulachek Y.V.

Bukovinian State Medical University, Chernivtsi, Teatralna sq., 2, 58002

Summary. In order to determine the features of electro- and echocardiographic criteria for left ventricular hypertrophy (LVH) examined 202 patients with coronary heart disease was observed in 164 (81.19%) patients, and hypertension, among which 156 (77.23%) cases detected hypertensive disease, and 46 (22.77%) - symptomatic hypertension. The predominance in younger people (according to the distribution of 44-45 years) essential hypertension stage II and ejection fraction, proposed the use of the first derivative of the electrocardiogram as a criterion of LVH.

Key words: left ventricular hypertrophy, arterial hypertension, heart, age.

Introduction.

Left ventricular hypertrophy (LVG) in patients with arterial hypertension (AG) and ischemic heart disease (IHD) is closely related to the development and progression of coronary heart disease, cerebrovascular pathology, heart failure (HF), sudden cardiac death and overall mortality, during the regression of LVG is associated with a reduction in mortality from cardiovascular disease.

Recent recommendations [8] show that the most informative electrocardiographic (ECG) signs of LVG are the Sokolov-Lyon and Cornell power index.

The aim.

To determine the relationship and informative value of different diagnostic systems of LVG, to evaluate them in comparison with echocardiographic indicators and results of differentiated electrocardiography, clinical manifestations and in the age aspect.

Materials and methods.

The authors examined 202 patients with presence of LVG in diagnose, who were treated at at the Chernivtsi regional cardiological center. The gender distribution of patients: 86 men (42.6%) and 116 women (57.4%), the average age of patients was 53.77 ± 0.57 years, respectively in groups by gender - 52.30 ± 0.85 and 54.87 ± 0.75 years. Distribution of the diagnosis among the examined patients: IHD were prevalent - 164 patients (81.2%), among whom stable angina (SA) of the I functional class (FC) was diagnosed in two cases, in 63 persons (38.4%) – SA of II FC, in 99 cases (60.4%) – SA of III FC. Hypertonic disease (HD) was detected in 156 cases (77.2%), in 46 patients (22.8%) the symptomatic hypertension (SG) were diagnosed. The incidence of heart failor (HF): HF I stage in 71 cases (35.2%), HF II stage in 131 cases (64.9%).

During 202 patients examined, 161 (79.7%) had signs of GIH, 161 patients (79.7%) had signs of LVH during previous clinically examination (ECG, echocardiography, etc.) and treatment.



The ECG criteria of the determination of LVG were: Sokolow-Lyon and Cornell criteria of LVG, Lewis or Gubner-Ungerleider index, Framingham Criteria and Indices of the Minnesota Code, Scott and Romhilt-Estes Criteria etc.

The registration of ECG was accompanied by an assessment of LVG signs according to ultrasound examination using the apparatus "SAL 38AS" ("Toshiba", Japan) and "Interspec XL" ("BBC Medical Electronic AB", USA) according to the recommendations for echocardiography (EchoCG) [7].

Differentiated ECG were evaluated for all patients while using ECG and The use of semi-automatic graphic processing of digitized first derivative of an ECG by E.S.Halfen (1986). The analysis was related to the maximum speed (RMS) of change in the potential difference on the second knee of the tooth T to the maximum speed on its first knee, the ratio of neighboring extreme values (RNEV) [1].

The statistic processing of the obtained results was carried out according to the data presented in the form of the average and the standard error of the average ($M + m$) using the electronic database and the program Microsoft Excel'2007 (Microsoft, USA) with the assessment of the degree of difference between groups with usage of nonparametric and parametric methods.

Results.

It has been established that symptomatic hypertension, as a provocative factor of the LVH development, was present in 16 out of 86 men and 30 out of 116 women ($18,60 \pm 4,19$ and $25,86 \pm 4,06\%$, $p > 0,2$), essential hypertension (EH) II degree in the comparison of men and women was 31 out of 86 versus 38 out of 116 ($36,04 \pm 5,17$ versus $32,76 \pm 4,36\%$, $p > 0,5$), EH II degree was found in 39 cases out of 86 versus 48 out of 116 ($45,35 \pm 5,36$ versus $41,38 \pm 4,57\%$, $p > 0,5$). Consequently, it is proved the possibility of the basis for the occurrence of LVH. AG in its various forms is defined uncertainly more often for EG II and EG III for men, unlike SH

According to the age (younger / older than 44/45 years), the following distribution of hypertension in its form of the EH II degree was determined, which is optimal for the analysis of LVH, which was observed in 15 out of 22 persons of younger group versus 54 of the 180 eldest ($68,18 \pm 9,93$ vs. $30,00 \pm 3,41\%$, $p < 0.001$), which indicates its significant prevalence at the younger age, and hence the processes of remodeling of the LV. The age distribution in the future also affects echocardiographic parameters, including in accordance with the changed parameters of the long and short heart axis[9], which, in turn, depends on the sex and body mass index, the content of adiponectin and the increase in the incidence of cardiovascular events[10].

The most informative criteria among the ECG-criteria of LVH are Scott's criteria (20.8% of cases), Estes criteria (16.8% of cases) and so-called other criteria of LVH, (78.7 - 63.9) in comparison with Sokolow-Lyon, Cornell and Framingham criteria, etc.

The main method for evaluating hemodynamic indices is echocardiography. In general, in the examined group the size of the left atrium (LA) was 4.01 ± 0.04 cm, the aorta (Ao) was 3.33 ± 0.03 cm, the final diastolic size (FDS) 4.76 ± 0.05 cm, the final systolic size (FDS) 3.17 ± 0.04 cm. Therefore, estimated final diastolic volume (FDV) by L.Teicholz method was $108,47 \pm 2,62$ ml, final systolic volume (FSV) -



41.64 ± 1.26 ml, left ventricular ejection fraction - $62.31 \pm 0.29\%$, interventricular septal thickness in diastole - 1.21 ± 0.01 cm, the thickness of the back wall of LV in diastole - 1.19 ± 0.01 cm, right ventricle - 2.35 ± 0.01 cm.

In the age aspect, when comparing echocardiograms, the difference in hemodynamic indices is unreliable, except for the left ventricular ejection fraction, which prevailed in young people (64.37 ± 0.84 and $62.05 \pm 0.30\%$, $P < 0.02$). This may be due to the analysis performed in patients who are at the lower border of the age distribution of the onset of a climax in the 44-45 years, and not on the verge of 54-55 years.

Thus, in the work, a significant predominance of the EH II in the younger age that actively influences the processes of remodeling of the LV is determined, and the age is a preforming factor of changes in echocardiographic parameters [9], which most closely correlates with changes in the contractility during the ejection fraction analysis. The correlation between the system of related assignments for the first ECG derivative, reflecting the anterior / posterior / partition / lateral walls of the LV, and the age aspect is not proven.

Conclusions.

The study of electrocardiographic and echocardiographic criteria for left ventricular hypertrophy shows the ambiguity of the proposed Sokolow-Lyon and Cornell indices, which we need to be expanded with the use of the first derivative of the differentiated electrocardiogram. They may indicate age features of the development of left ventricular hypertrophy in a screening study of patients with coronary heart disease and arterial hypertension.

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