UDC: 616.12-005.4:616.124.2-06-008.46:616.127-072.7

**EVALUATION OF THE DEFORMATION PROPERTIES OF THE MYOCARDIUM IN PATIENTS WITH ISCHEMIC HEART DISEASE WITH MARKED DILATATION OF THE LEFT VENTRICULAR CAVITY IS COMPLICATED BY HEART FAILURE**

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In research estimated the changes of deformation properties of myocardium for the patients of IНD with the expressed dilatation of cavity of the left ventricle by the complicated cardiac insufficiency before spliced of myocardium**.**

As a result of inspection 250 the patients of IНD with the expressed dilatation of cavity of LV and signs of cardiac insufficiency were exposed, that the indexes of longitudinal deformation of myocardium are mionectic to -6.4±3.98% when compared to the group of healthy persons, to circular deformation to -7.8±2.2%, in area of apex circular deformation of myocardium was moderate (-12,5±6.03%). Is the function of rotary press and wring of LV in basal departments mionectic to -3,16±0,2%, and at the level of apex to 2,47±0,6 %. Did the analysis of deformation properties of myocardium rotin that in the group of patients of IHD with the expressed dilatation of cavity of LV and cardiac insufficiency 3-4 FС longitudinal deformation is mionectic to 5.5±0.9%, circular in basal departments to 5.5±1.1%, in area of apex to 7.7±1.2%, rotary press to 2.3±0,7. Diagnostics of deformation properties of myocardium of the left ventricle for the patients of IHD with dilatation of cavity of LV depending on FC of cardiac insufficiency allows to define tactic of treatment of patients.

 **Keywords**: longitudinal deformation, circular deformation, speed of deformation, IHD, segmental contractility of the left ventricle, cardiac insufficiency.

Cardiac insufficiency, in connection with wide distribution continues to remain one of the most essential problems of practical medicine of the whole world. Its actuality and socio economic meaningfulness is determined the high level of morbidity, to incapacitating and death rate above all things among an able to work population [2,4]. From data of statistics in Ukraine the indexes of cardiovascular death rate in 2-4 times are higher, than in western-european countries. Choice of medical tactic of patients by ischemic heart disease (IHD) trouble by the complicated cardiac insufficiency, determined not only the state of coronal river-bed, and in a greater degree by the features of endocardial and systemic hemodynamics, state of myocardium and presence of large areas of hibernation myocardium. The most widespread method of diagnostics of dysfunction of myocardium is (EKHO KG) [3, 5, 7, 8]. In also time program of complex estimation of coronal blood stream development, structural-geometrical and functional indexes of heart will allow to choose optimum tactic of conduct of patients of IHD. Research purpose: To estimate the changes of deformation properties of myocardium for the patients of IHD with the expressed dilatation of cavity of the left ventricle by the complicated cardiac insufficiency before revisualization of myocardium.

Material and methods: An inspection is conducted 250 with the expressed dilatation of cavity of the left ventricle and signs of cardiac insufficiency Middle age made the patients of IHD 58.5+6.4 years, from them 198 (79,2%) men, 52 (20,8%) women and 100 healthy persons.

Middle age in the group of healthy persons made 29,4+5,6 years. From them there are 63 men (63%) and 37 (37%) women. For 30 (12%) patients IHD was exposed a 1 functional class (FC) of cardiac insufficiency (SN) of NYHA, 2 (FC) — at 71 (28.4%) patient, 3 FC — for 102 (40.8%) patients and 4 FC - at 47 (18.8) patient.

All researches are executed on the ultrasonic scanner of «Siemens ACUSON X-300 PE» and “Kontron Agile Imagic”. Image processing performed in offline mode.

At every research conducted registration and estimation of parameters of hemodynamics, estimated segmentation contractility of myocardium of LV. Among parameters [1, 4. 5, 7, 10], were chosen by us:

 - strain (%) is a degree of deformation of segment of myocardium;

 - strain rate (s-1) is speed of deformation of segment of myocardium; it is a rotary press of basal and apical side of the left ventricle in relation to his longitudinal axis (further is a rotary «press»);

- twist is a degree of wring of the left ventricle (further is a «twist») [1, 8].

 **Results and discussion:**

 From data of the conducted inspection of patients of IHD with the expressed dilatation of LV and cardiac insufficiency at all the reliable decline of indexes of longitudinal deformation of the left ventricle was exposed (longitudinal strain). In a norm longitudinal deformation makes in this age-dependent group of -15.9 ±2.4 %. For patients with cardiac insufficiency indexes appeared mionectic to -6.4±3.98 % (table. 1). From data, to present in a table evidently, the reliable decline of circular deformation of myocardium and function of rotary press for the patients of IHD with the expressed dilatation of cavity of LV with cardiac insufficiency is exposed in basal departments and in area of apex. The substantial decline of circular deformation of myocardium is marked in area of basal departments of the left ventricle. In area of apex circular deformation of myocardium was mionectic moderate (-12,5±6.03).

Table 1

Indexes of longitudinal, circular deformation and rotary press for the patients of IHD with the expressed dilatation of LV and cardiac insufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Norm | For patients of IHD with the expressed dilatation of LV and cardiac | Р |
| Longitudinal strain % | -15,9±2,4 | -6.4±1.78 | <0.01 |
| Cyclothymic strain in basal division LV % | -16,2±1,3 | -7.8±2.2 | <0,01 |
| Cyclothymic strain in apex division LV %. | -16,4±1,06 | -12,5±0.63 | <0.01 |
| Rotation in basal division LV º | -4,2±0,2 | -3,16±0,2 | <0,05 |
| Rotation in apex division LV º | 8,3±1,8 | 2,47±0,6 | <0.01 |

 To one of important making there is a rotary press of basal departments and apex of the left ventricle in indemnification the function of the left ventricle. In a norm a rotary press is carried out in various directions. Foundation of ventricle moves clockwise and an apex is in opposite direction (anticlockwise). It is accepted to name such motion a wring or twist and this index is measured in degrees. In a norm he makes a 12.5±5.7 degree. From data of inspection for the patients of IHD with the expressed dilatation of LV with cardiac insufficiency the reliable decline of rotary press and twist is marked in basal departments to -3,16±0,2 and at the level of apex to 2,47±0,6.

During the analysis of changes of the left ventricle for the patients of IHD with the expressed dilatation of cavity of LV and different functional classes of cardiac insufficiency worsening of work of the left ventricle is exposed for patients from III and by the IV FC of NYHA (сhart .1, 2).



Longitudinal strain %

Cyclothymic strain in basal division LV %

Cyclothymic strain in apex division LV %

1- patients of IHD with the expressed dilatation of cavity of LV and cardiac insufficiency of I-II FC

 2- patients of IHD with the expressed dilatation of cavity of LV and cardiac insufficiency of III-IV FC.

 Chart 1. Indexes of deformation of myocardium for the patients of IHD with the expressed dilatation of the left ventricle and different functional classes of cardiac insufficiency.



Rotation in basal division LV º

Rotation in apex division

LV º

Twist LV

1- patients of IHD with the expressed dilatation of cavity of LV and insufficiency of I-II FC.

2- patients of IHD with the expressed dilatation of cavity of LV and insufficiency of III-IV FC.

 Chart 2. Indexes of rotary press and twist for the patients of IHD with the expressed dilatation of the left ventricle and different functional classes of cardiac insufficiency.

For patients from 2 FC NYHA indexes are for certain mionectic only to longitudinal deformation. Circular deformation in basal departments and in area of apex for certain not changed. The typical is saved for the normal function of the left ventricle predominance of circular deformation in area of apex above foundation. For patients from 4 FC takes place fall-off of deformation of myocardium both in longitudinal and circular directions. Thus sharply deformation falls in area of apex. Analogical changes are exposed and on the indexes of function of rotary press of myocardium. A rotary press is evenly mionectic in basal departments and at the level of apex. Thus for patients from 3-4 FC is observed more expressed violation of this function of the left ventricle. A twist goes down substantially (fig. 2). It is marked as a result of analysis of the got data, that for 4 patients of IHD with the expressed dilatation of LV and cardiac insufficiency direction the rotary press of foundation and apex is violated. The change of direction a rotary press testifies to the heavy breach myocardium of the left ventricle.

 Thus, diagnostics of deformation properties of myocardium of the left ventricle for the patients of IHD with dilatation of cavity of LV depending on FC of cardiac insufficiency allows to select patients with heavy breach the left ventricle. Tactic of treatment of these patients must sneak up individually. At diagnostics of the expressed changes of longitudinal and circular deformation properties of LV it is necessary to conduct additional researches of function of myocardium for diagnostics of hybernation myocardium for the patients of IHD with the expressed dilatation of cavity of the left ventricle by the complicated cardiac insufficiency before revasculization of myocardium.

 **Conclusions:**

1. Diagnostics of deformation properties of myocardium of the left ventricle for the patients of IHD with dilatation of cavity of LV depending on FC of cardiac insufficiency allows to select patients with heavy parafunctions the left ventricle.

 2. Decline of indexes of longitudinal and circular deformation in the basal departments of the left ventricle below 5.5% is the sign of the expressed cardiac insufficiency.

3. For the patients of IHD with the expressed dilatation of cavity of LV and decline of deformation properties of myocardium of tactician of surgical treatment must determined after the additional estimation of viability of myocardium of the left ventricle.

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