DIAGNOSTIC OPPORTUNITIES OF DISPERSION MAPPING IN ESTIMATION OF INFRINGEMENT CORONARY BLOOD-FLOW AND ELECTROPHYSIOLOGICAL PROPERTIES OF MYOCARDIUM AT PATIENTS WITH CORONARY ARTERY DISEASE

Ahmed Elgaili Ahmed

Omdurman Military Hospital (Alsilah altiby)
Sudan, Omdurman 11220 Almorada str.

V.E. Dvornikov, M.R. Aleksandrova, S.Yu. Kuznetsova, G.G. Ivanov

Department of hospital therapy
Medical faculty
Peoples' Friendship University of Russia
Miklukho-Maklay str., 8, Moscow, Russia, 117198

Dispersive mapping is a new method of the diagnostic electrocardiogram. In the basis of this method is the analysis of low amplitude fluctuations of ECG-signal, existing in norm and pathology. Results of the lead researches have allowed to designate a range of changes the parameters of a dispersion for healthy persons at loading and patients with ACS.

Kay words: dispersion mapping method, coronary artery diseases.

Background. Despite of positive influence of revascularisation procedures on the forecast, lesion of myocardium up to and in a course percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) in many respects define the further current of disease. Adequate noninvasive estimation including electrocardiograms (ECG) methods diagnostics of ischemic changes and a power metabolism of myocardium, is clinically proved necessity. Opportunities improvement diagnostics of lesion and infringement electrophysiological properties of myocardium at patients with acute coronary syndrome (ACS), during operative and intensive treatment at patients with diffuse atherosclerotic lesion and isolated segmentary stenosis, are far from being exhausted.

Among new ECG methods which now everyone are more widely used in scientific researches and daily clinical practice for estimation of infringements the electric properties of myocardium, it is possible to note a method of dispersive mapping. Dispersive characteristics at development pathology of myocardium start to change earlier, than waves at standard ECG. Therefore, if to supervise dispersive characteristics of an ECG, it is possible to receive the information on development of pathological process with anticipation, i.e. at early stages. It is shown, that now it can be used as screening test for revealing changes de- and repolarisation properties of myocardium. However real opportunities of the device and the method undoubtedly are wider.

Acknowledgement of validity use the analysis low amplitude fluctuations are numerous researches of a dispersion duration and amplitudes P-wave, QRS-complex, T-wave, interval QT according to a standard ECG and orthogonal assignments. Close approaches are applied at the analysis of alternation T wave with use of a principle «beat-to-beat». Heterogeneity of repolarisation can be reflected not only in increase of parameters dispersion of time areas, but also a dispersion peak repolarisation parameters, in particular T wave. The ischemia of myocardium is accompanied by formation of zones with the broken electrophysiological properties in ischemic myocardium.

Now there is no experience of wide clinical application of parameters dispersive mapping (DM) for an estimation of a condition of electrophysiological properties of a myocardium and dynamics of process electric remodeling. Therefore, the study research of diagnostic opportunities of DM method in an estimation of infringements of coronary blood-groove and ischemic changes of myocardium with the analysis of dispersive characteristics de- and repolarisation myocardium is represented by an actual clinical problem.

Methods. This study included 47 healthy persons and 63 patients from acute coronary syndrome (ACS). Inspection was carried out at receipt, after carrying out coronarography and operative treatment (in 1 day). Middle age has made 56,2 ± 2,1 years. From them 54 (86%) men and 9 women (14%). Depending on the revealed lesion of coronary vessels at 3 groups of patients are allocated: one, two and three-vascular lesion (tabl. 1). As follows from the submitted data, at 36 (57%) patients the stenosis of one coronary artery, at 13 and 14 accordingly stenosis of 2 and 3 vessels is revealed.

Table 1

Frequency of registration and localization of vascular lesions in group depending on values index of «Myocardium» at receipt

Num of Stic vess	Patient with ACS (*n* = 63)			
	All	Localization		
		RCA	LAD	CX
1	36 (57%)	9	26	1
2	13 (21%)	13	11	2
3	14 (22%)	14	14	14
Total	63	36	51	17

Method DM. The principle of action of the device is based on a new method of the analysis casual low amplitude (10—30 mkV) fluctuations of the ECG-signals which can be revealed on all an extent cardiocycles (P-QRS-T). The received results the analysis of dispersions fluctuations of amplitudes de- and repolarisation atrium and ventricles. The method is based on information — topological model of small fluctuations of ECG. The amplitude of these fluctuations makes 3—5% from amplitude R-wave. The dispersive characteristics corresponding to separate group of deviations, look like the functions of time describing average peak variations on certain sites cardiocycle. For the quantitative analysis gradational criteria *G3-G9* were used which are displayed the display. On the basis of special averaging indexes *G3-G9* the basic is formed the new findings in microalternance index «Myocardium».

The data of procedures PCI were analyzed. Measurement of dispersive characteristics was carried out in the beginning of procedure, before each inflating, after and at the end of procedure. Time of one measurement of dispersive characteristics made 30 sec. The statistical estimation of change of average sizes of dispersive parameters was carried out at performance short-term balloon occlusions.

Statistical processing of results was carried out on a personal computer with the help of a package of statistical programs Microsoft Excel and package STATISTICA (v 6.0). Results of research are submitted as average arithmetic values ± standard deviations (M ± δ). For an estimation of the importance of distinctions between the data of research in different groups of patients *t*-criterion Students is used. Distinctions were considered authentic at $p < 0,05$.

Results. In research the data of 63 patients with ACS, surveyed have been includeed at receipt and in the 1st day a field of carrying out coronarography and operative treatment — stenting (54,5 ± 3,6 years). Among the surveyed 57% patients with defeat of 1 vessel made, and 43% had lesion of 2 and 3 vessels. The results of parameter DM at patients with ACS at revascularisation of myocardium and the analysis of dependence on weight of lesion coronary vessels has shown an index «Myocardium» is not exceeding in norm 15%, was more often above in group with 3 vascular lesion (in 93% of cases) (tabl. 2).

Table 2

Frequency of registration 1, 2 and 3 vascular lesions in the surveyed group of patients depending on threshold values of an index «Myocardium» (> 15%)

Num of struck vessels (stenosis > 50%)	Quantity of patients	Index «Myocardium» > 15%	Index «Muocardium» < 15%
1 vascular vessel	36 (57%)	23 (67%)	13 **(33%)**
2 vessels	13 (21%)	**10 (77%)**	3 (23%)
3 vessels	14 (22%)	**13 (93%)**	1 (7%)
Total	63 patients	46 (73%)	17 (27%)

Parameters of an index «Myocardium» were more at 2 and 3 vascular lesion both at receipt, and after operative treatment in comparison with the data in the 1st and control group. And if in the 1st group after day of value of an index remained without change, in the 3rd group they were authentically reduced from higher values (with 26,1 ± 1,5 up to 23,5 ± 1,0%), that reflected significant effect of therapy in a background of the greater in an outcome of lesion of myocardium. Parameter of T-wave alternance (TWA) was authentically reduced at one-vascular lesion (with 15,0 ± 0,8 up to 10,8 ± 0,8 mkV) and the tendency to reduction has been marked at two and three-vascular lesion.

The analysis of dependence of changes of parameters of dispersive fluctuations of complex QRS (G3 and G4, mkV x ms) and T wave (G5 and G6, mkV x ms) at patients with ACS at receipt and after operative treatment for quantity of the affected vessels, has revealed the maximal changes in repolarisation an interval (T-wave) (G5, G6) in group with 2 and 3 vascular lesion both at receipt, and in the first day after revascularisation. Their average values exceeded those in the 1st group in 3—4 times, and normal values in 10 times.

The received data on diagnostic value of values of an index «Myocardium» at receipt (on I a stage of inspection) as parameter, lesion 1 and 2—3, 1 and 3 vascular lesion are submitted in table 3. Values of sensitivity of a parameter «Myocardium» on division of 1 and 2—3 vascular lesions are high enough, as well as parameters of forecasting value of negative result.

Table 3

Parameters of diagnostic value of an index «Myocardium» (a threshold up to 15%) at comparison 1 vascular with 2—3 and 3 vascular lesion

Parameters	Lesion 2—3 vessels	Lesion 3 vessels
Sensitivity	85%	93%
Specificity	36%	36%

As a whole, by the received results it is necessary to note, that dispersive criteria during angioplasty procedure are characterized by intensive dynamics. The most significant changes as increase and reduction of dispersive criteria are observed at two stages of procedure — in the beginning of procedure and at inflating cylinders. As in earlier carried out works it is established, that dispersive criteria have high repeatability for a normal myocardium, it is possible to approve, that observable dynamics reflects true processes electrophysiological microfluctuations.

Hence, observable fluctuations of dispersive characteristics reflect real dynamics of electrophysiological microchanges in myocardium at performance of angioplasty procedures. As high repeatability of dispersive characteristics in a condition of physiological norm is the fixed fact, these variations objectively reflect a picture of microfluctuations of electrophysiological characteristics in the initial stages PCI. The detailed reasons of these fluctuations are unknown now.

The preliminary results received by us have shown presence of changes the parameters DM at patients with ACS. Validity of given approaches is based on representation, that electrophysiological alternation of cells associates with functional and morphological remodeling a myocardium. Electric remodeling outstrips structural changes and it is more sensitive concerning processes occurring in myocardium.

ИССЛЕДОВАНИЕ ДИАГНОСТИЧЕСКИХ ВОЗМОЖНОСТЕЙ МЕТОДА ДИСПЕРСИОННОГО КАРТИРОВАНИЯ В ОЦЕНКЕ НАРУШЕНИЙ КОРОНАРНОГО КРОВОТОКА И ЭЛЕКТРОФИЗИОЛОГИЧЕСКИХ СВОЙСТВ МИОКАРДА

Ахмед Эльгили Ахмед

Военный госпиталь города Омдурман (Алсилах альтиби)
Судан 11220, Омдурман ул. Альморада

В.Е. Дворников, М.Р. Александрова, С.Ю. Кузнецова, Г.Г. Иванов

Кафедра госпитальной терапии
Медицинский факультет
Российский университет дружбы народов
ул. Миклухо-Маклая, 8, Москва, Россия, 117198

Дисперсионное картирование является новым методом ЭКГ-диагностики. В основе метода лежит анализ, существующих в норме и патологии низкоамплитудных колебаний ЭКГ-сигнала. В работе представлены результаты изучения дисперсионных характеристик ЭКГ-сигнала у здоровых лиц и пациентов с ОКС. Анализ полученных данных у больных ОКС показал, что изучаемые показатели и динамика их изменений ассоциируются, в основном, со степенью выраженности поражения коронарных сосудов

Ключевые слова: дисперсионное картирование, поражение коронарных сосудов.