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CAPABILITIES OF RADIO DIAGNOSTIC TECHNIQUES FOR EVALUATING MYOCARDIAL HEMODYNAMICS AND CONTRACTILITY IN VENTRICULAR ARRHYTHMIAS

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ABSTRACT

Heart rhythm disturbances are important not only for media Qing, but also social pro- blame. Some types of arrhythmias in particular ventricular disorders rhythm changes, can be evil qualitative character and often that cause sudden of death. Other types of violations heart rate can significantly reduce the quality of life and lead to disability of the patient comrade Under the ventricular Rhythm Schemes (RHR) of the heart understand arrhythmias, source excitation of which is located women below the atrioventricular connections, - in any department le intraventricular wire the leading system (the bundle of His, his peduncles or Purkinje fibers) or in the ventricular myocardium.

K**eywords:** The group of HRH of the heart includes both extremely unfavorable, evil qualitative, forms, representing posing an immediate threat for the patient, and relatively "favorable" - few symptoms nye options that rarely lead to the development of serious complications.

INTRODUCTION

Heart rhythm disturbances are important not only for media Qing, but also social pro- blame. Some types of arrhythmias in particular ventricular disorders rhythm changes, can be evil qualitative character and often that cause sudden of death. Other types of violations heart rate can significantly reduce the quality of life and lead to disability of the patient comrade Under the ventricular Rhythm Schemes (RHR) of the heart understand arrhythmias, source excitation of which is located women below the atrioventricular connections, - in any department le intraventricular wire the leading system (the bundle of His, his peduncles or Purkinje fibers) or in the ventricular myocardium. The group of HRH of the heart includes both extremely unfavorable, evil qualitative, forms, representing posing an immediate threat for the patient, and relatively "favorable" - few symptoms nye options that rarely lead to the development of serious complications [1].

Studying the latest is a current issue: modern arrhythmology and cardiology, especially in terms of evaluating ki for forecasting the current of the specified pathology [2].

Asymptomatic arrhythmias account for about 30% of the total number of heart and have a

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variety of etiological logical and pathogenetic OS- new [1, 3].

Therefore, at present time clinical arrhythmology is one of the significant rapidly and dynamically developing current sections of modern cardiology. Most often ZhNR develops are used in acute myocardial infarction cardia, myocarditis, cardiomyo- pathologies and heart defects [1, 3]. However, in some cases establish the nature of the rhythm disturbances fail, and then the arrhythmia that arose from wear to idiopathic. Prolonged course of VNR at- leads eventually to significant structural changes in the heart tsa - an increase in the volume of the stomach daughters and changes in morphology cells [4, 5], which, in turn, contributes to the development of chronic heart failure (SN). At the same time, the methodology early assessment of contractile heart function in VNR up to end has not been developed. Due with this improvement of non-in- invasive ways to detect contractile dysfunction of myocardia in patients with ventricular represents you with arrhythmias is an up-to-date scientific and practical tic task. At present time to determine the function oral state of the heart is use beam methods following, which practically ki there is no alternative. echocardiography Echocardiography is public evaluation method heart functions. In modern literature there is a limit a certain number of works devoted to ultrasonic assessment of the function mental state of the heart in patients nyh with ZhNR. So, in the study B. Zaborska et al. [6] in 40 patients (mean age 55±15 years) with frequent idiopathic ventricular extrasystoles (ZhE) (>2500 per day) indicator- whether hemodynamics were measured with the power of tissue Doppler echocardiography in sinus rhythm during PVC episode and between episodes of PVCs. At the same time, significant differences stroke volume (SV) between the groups, no lo. However, there was a correlation cationic connection of the left ventricular daughter, measured during occurrence of PVC, with an interval clutch. Maximum speed increase in left ventricular ejection during the attack, PVC was significantly less than the measured naya on sinus rhythm and in inter- the onset period in all patients. In the presence of violations of rhythm ma heart echocardiography diography is shown to reveal niya comorbidity, the presence of which will be taken into account when prescribing a pathogen theoretically based therapy [7]. The left ventricle is visualized echoed in all standard echoes cardiographic sections [8, 9], and ultrasonic semiotics his pathological conditions, including rhythm disturbances, worked well enough. Ultrasonography evaluation as contractility of the right stomach daughter has a number of restrictions, associated with complex geometry her cavity [10].

As known- but, in the transverse plane, it has the shape of a crescent, and in sa- gytal - pyramid shape and hard to describe using generally accepted mathematical models [10]. In addition, high trabecular inner surface right ventricle complicates identification of the endocardium, which, in turn, makes it difficult to determine dividing the boundaries of the chambers of the heart for calculation of volume indicators. In his study, E.G. Ver- chenko [11] determined echocardio- graphic features outside diastolic function left ventricle and factors development of arrhythmogenic cardiomyo- pathy in children. In research 80 patients were included aged 1.5 months to 17 years with tachyarrhythmias, in the control group included 102 children without cardiovascular pathology. echocardiography and doppler echocardiography was performed for all patients with tachycardia and sinus rhythm. Assessing the main hemodynamic some indicators of LV. Arrhythmogen- noe expansion of the LV cavity during continuous tachycardia time type was detected in 24% of children. HF symptoms have occurred in 40% of the examined children. By- after relief of heterogeneous rhythm in 50% of children with HF LV cavity remained even in sinus rhythm. Besides, in almost all patients from marked desynchronization of

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work chambers of the heart. Was revealed degree correlation severity of heart failure with maximum speed growth of diastolic filling niya against the background of tachyarrhythmia. According to re- the results of the work performed the author singled out functional stages of tachyarrhythmia, and also identified the main ultrasonic signs of dia- LV capital dysfunction and diagnostic criteria arrhythmogenic cardiomyopathy increase in volume indicators lei of the heart, a decrease in EF and impaired synchronicity is abbreviated niya wall of the left ventricle. Currently being developed echocardiographic methods of visualization of foci of ex topias as an alternative electrophysiological following. The purpose of the experiment C. Bara et al. [12] was the development of a method Diki 3D Ultrasonic visualization of the heart. Labora tor animals ablation of the atrio- ventricular node, electro- physiological mapping myocardium and transesophageal echo cardiography. Next, compare localization of arrhythmia zones according to both diagnostic methods. The authors came to water, which with the help of echocardiography it is possible to determine the zones of ectopia, because their location is the same with that according to electrophy- siological research [12]. J. Yao et al. [13] was studied violation of contractility ty of the left ventricle in 29 patients comrades with idiopathic right- ventricular extrasystoles and conducted a comparative analysis lysis with data from 30 healthy tortured. With the help of doppler EchoCG, the authors studied the speed deformation properties myocardium of the left ventricle. Pa- PVC patients were characterized more pronounced intragastric daughter dyssynchrony. Except In addition, the authors found positive correlation of the mean si- ly ($r=0.44$, $p=0.02$) between the frequency that PVC and dissynchronization index research institutes of LV. Based on received results, the authors make conclusion that the presence of a right daughter extrasystole caused dit to impaired contractility LV as during extrasystole, and sinus rhythm. B.W. De Boeck et al. [14] published rejoiced at the results of clinical th observation of a 51-year-old patient tape with drug resistance a form of Wolf-Par syndrome Kinson-White (WPU). Before procedure of radiofrequency ab- (RFA) this patient was la performed echocardiography in B-mode, with further post- swarming deformation curves stomach. Based analysis of curves of circular de- formation was localized on early contraction of myocar- yes, which corresponded to below her LV wall. According to the ECG and electrophysiological research following the zone of early excitation denia was also in the ba- hall sections of the back partition daughter area of left ventricle.

After successful RFA procedure disappeared the development of the zone of early excitation according to ECG data, it was combined with normalization of phase characteristics teristic contraction of the heart. Based on this clinical which case the authors do you- waters about the high accuracy of two-dimensional assessment of myocardial deformation yes in early identification zones abbreviations. Magnetic resonance tomography An informative method of evaluating ki function of the heart, according to a number of authors, is highly field magnetic resonance tomography (MRI) [7].

Achieve- research in the field of MR-tomography fii hearts made possible use of this technique to assess the morphological myocardial changes, which can can accompany or appear arrhythmia substrate. In their study, D.G. Aqua- aro et al. [15] determined the possibility frequency prediction capability development of unfavorable ser- day events with the help of MRI technique in patients with arrhythmia genetic dysplasia of the right ventricle (AVPZh). Were serviced 440 patients with frequent PVCs in which motion was assessed wall motion, volumetric body and EF of the pancreas. The authors vili that ARVD accompanies- with the following MR

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signs in the right ventricle: change signal from the myocardium, on- destruction of the contraction of the wall of the pancreas, dilatation of its cavity and decrease fv. By the number revealed- ny signs, the patients were divided into three groups: the 1st group included persons who have there was at least one sign ARVC, in the 2nd group - several to signs, patients of the 3rd group we had no MRI signs ADPZh. As a result of the analysis, lo found that in the presence several MR criteria the development of cardiac events tiy was significantly higher than in individuals with single criteria ADPZh or without them. Nali- chie only one criterion so- also increased the likelihood of development of unfavorable heart events. All this allowed authors to conclude that using MRI, it is possible to strategize to identify the risk of developing adverse good heart events in patients with frequent PVCs, while the most significant MRI-critical reception is pancreatic dyskinesia K. Ilg et al. [16] in the course of research treatment in 35 patients with idio- pathic ventricular tachy-cardia (VT) and PVC before and after radiofrequency ablation of lesions arrhythmias performed MRI of the heart with depth and area estimation myocardial damage and related tampered with the received data with radio frequency energy actions when performing electronic rophysiological research niya (EPI). Has been installed correlation between values of damage to myo- card and EFI characteristics. The greatest damage to myo- karda was observed when located arrhythmia focus in papillary lar muscles. The authors whether attention that small volume myocardial damage, revealing according to MRI data, statistical statistically significantly more often combined with no effect from RFA. In the study of C. Hasdemir et al. [17] included 298 pa-patients with VT, PVC and reduced LV ejection fraction (<50%). After RFA in 22 patients EF LV recovered to normal small values, the rest patients this indicator did not change significantly. Con-trust MRI of the heart was administered to 19 patients with positive body dynamics and 5 patients there is no effect of treatment.

During the processing of results studies in 5% of patients with positive dynamics and in 80% of patients without dynamics treatment was discovered later. contrasting. The authors they say that the phenomenon of late contrasting is rarely observed given in patients with ventricular your heart rhythm disturbances ca, and its detection is unfavorable prognostic key factor in terms of evaluation treatment effectiveness. At the same time, MRI has a number of limitations, including which include: enough long research time research, the presence in patients severe arrhythmias heart, impossibility to examine treatment of patients with claustrophobia her, artificial drivers rhythm [9]. CT scan CT scan (CT), like MRI, provides heart imaging in high resolution, which allows you to accurately measure volumetric ventricular scores. The the method is used in those patients goods that do not have possible echocardiography or MRI of the heart in connection with numerical above limits- these methods [7].

In modern in the literature there are only low application messages CT in patients with VHR of the heart. M. Takagi et al. [7] studied the possibility of using CT to determine the morphological some changes in the myocardium in patients nyh with Brugada syndrome and assessed nivali the relationship between you- revealed foci, zones with ST segment elevation on ECG and topical origin premature ventricular abbreviations. Were examined baths 26 patients with the syndrome Brugada and 23 from the comparison group niya. In 81% of patients with impaired rhythm and 9% of the group compared nia in the right ventricle were morphological changes. In the exit department right ventricle they determine were observed in 17 patients, and in 4 people century - in the apical parts of the pancreas When compared with the result - mi electrophysiological research follow-up was noted practically cheski full coincidence of locale- of foci of

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arrhythmogenesis and zones morphological disorders in CT data. Radionuclide diagnostics Publications of recent years show that in order to evaluate functional state of myo- ventricular cardia may be the radionuclide method was used noah equilibrium tomoventriculo- graphics, comparable in exactly sti definition of the main indicators hemodynamics and evaluation dyssynchrony with magnetic resonance nance tomography of the heart [18]. It should be noted that the method radionuclide indication compare favorably with others methods of radiation diagnostics its functionality and you juice reproducibility, and the possibility of obtaining in- formations about the dynamics of physiological logical processes [2, 19–21] Phase Analysis Algorithm allows such radionuclide nym cardiological method kam like ecg-synchronized perfusion scintigraphy myocardium and ECG-synchronized bathroom equilibrium tomoventri- culography, assess the mechanics myocardial dyssynchrony ventricles. In foreign and domestic in the literature are found only single reports about the use of use of radionuclides methods for evaluating the functional the state of the heart in pa- patients with different shapes rhythm disturbances and conduction ti [22, 23]. Thus, a group of scientists from France tions led by J.F.

Toussaint [24] a study was carried out showing high reproducibility conductance of a planar radionuc- leading ventriculography (RVG) in the assessment of myocardial dis- synchrony. Scintigraphic research was done 26 patients aged 62±7 years without cardiovascular pathology gee. There were no patients in the anamnesis cardiac diseases and no operations were performed heart. At the time of the study All patients had sinus rhythm, there were no blockade of le- howling of the bundle of His bundle, syndrome WPW, myocardial infarction and in them there were no artificial drivers rhythm ley. Evaluation of reproduction diversification was carried out by consecutive double records of a planar RVG in the left anterior oblique and left lateral projections, followed by botkoy received data two- me independent doctors-ra- diologists. It has been shown that the ability to calculate the total contraction time for the left ventricle was 1.4%, for right - 2.2%, and for interstitial daughter delay - 0.8%. Coefficient correlation factor between indicators, defined researchers, compiled: 0.9 - for the total time, reduce LV, 0.87 - for the general RV contraction time, 0.96 - for interventricular delay (all correlations were statistical sky-significant, $p<0.001$). According to the results, semi- J.F. Toussaint et al. veins inside and interventricular howling dyssynchrony, determined using RVG [24] and radionuclide tomoventricu- lography (RTWG), allow with greater accuracy than with the duration of the complex QRS [25–27] predict response to cardiac resynchronization schyu therapy. A number of studies carried out nyh recently, dedicated we use ECG-synchronous nized perfusion myocardial scintigraphy for counting heart rate dyssynchrony. So, according to the data received by M.A. Trimble et al. [28], total contraction time and intraventricular dissyn- chronia (VZD) of the left ventricle in the group of patients with impaired Rhythm Eat (with low LV EF (n=120), blockade of the left (n=33) and right (n=19) legs of the bundle sa, single-chamber electric cars diostimulators (n=23)) would whether significantly higher than in the group no comparisons (n=157). In a different research by the same authors [29], including 125 individuals with EF LV <35%, it is shown that with pro- time-long QRS available, according to ECG data synchronized perfusion than in patients with normal duration of stomach daughter complex. Wherein It is important to note that the co myocardial scintigraphy, more pronounced Dyssynchrony rrelation between the duration of QRS plex (as the main elect- ric indicator of dissinchronia) and scintigraphically detectable dyssynchrony (pro- contraction duration and standard deviation th contraction time) is low. These data show that the critical and mechanical dis- synchrony is not always interconnected zany. There

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are a number of works on use of radionuclides research methods for evaluating ki arrhythmogenic dysfunction myocardium of the right ventricle. So, in the work of D. Mariano-Goulart et al. [30] showed that RTWG allows adequate dia- gnostic diffuse and lo- fecal form of arrhythmogenic right ventricular dysfunction. The work was based on the results of recent research niya, according to which ARVZh may manifest severe loy heart failure or sudden death of the patient that. In this regard, it emphasizes the need to maximize early assessment of the state of myo- card with ventricular disorders heart rate fluctuations. Diagnosis- tick ARVC is based on accounting several criteria, developed of the International Association by cardiologists [31] . At this is the majority of functional nyh indicators, using in the process of setting di- agnosis of arrhythmogenic dysplasia right ventricle, can be semi- read with the help of RTWG [32]. With tomoventriculography, neither projection effects are overlay of the right pre- heart and pulmonary trunk right ventricle, which allows no correct inaccuracies you- numeration of its function in the course planar research. One- to use this method in the diagnosis of ARVD dedicated we are just a few messages[32–34]. In the case we have already mentioned following D. Mariano-Goulart [30] examined 59 patients comrades aged 20 to 78 years with the tanovlennym according to the data of rocardiography with a diagnosis of ventricular arrhythmias. In is- follow-up did not include faces with valvular pathology, left ventricular cardiomyopathy, congenital heart defects LV infarcts. To all patients they performed radionuclide equilibrium tomoventriculo- 99mTc-labeled erythrocytes rocytes. According to the results of the RTWG assessed hemodynamic indicators and synchronicity contractions of the right ventricle. All the subjects were distributed len into three groups: in the 1st group included faces without signs ARVZH (in accordance with the criteria riyami), in the 2nd - patients with loca- areas of dyssynchrony right ventricle, 3rd group were patients with diffuse dyssynchrony, widespread on the whole right stomach daughters. According to the results of the research hemodynamic parameters of the pancreas in the 1st and 2nd groups did not significantly differed, and the indicators reduced pancreatic timidity in the 3rd group were significantly lower than in the 1st group ne. Thus, the authors made whether the conclusion is that the RTWG method can be used to identify ADPZH in accordance with the criteria by the International Association tions of cardiologists [7].

Besides, this method makes it possible differentiate between local and diffuse form of ARVD. In a multicenter study on issues predictive evaluation of the result tatov equilibrium radionuclide noy tomoventriculography in pa- patients with right ventricular arrhythmias [27], were examined we are 188 people (average age 44±15 years). The patients were undressed len into three groups: 1) with the presence I eat ventricular arrhythmia (VA) and the absence of changes from ventricular crowns according to RVG; 2) with the presence of VA and single sections of asynchronous contraction scheniya, localized in the right ventricle; 3) with the presence of GA and diffuse zones of asynchronous in the myocardium of both ventricular cov. Prospective results follow-up (45±34 months) show- whether that the presence of zones of dyssynchrony in the ventricular myocardium is independent predictive factor in sudden cardiac arrest death and syncope. At the same time, other instrumental nye (ECG, Holter monitor- rirovanie) and clinical (you-severity of symptoms heart rate, the frequency of episo- dove ventricular tachyarrhythmia etc.) the data were not gnostic significance. P. Weismuller et al. [35] check whether research for the purpose of studying the possibilities of RTWG for non- invasive topical diagnostic tics of arrhythmogenic foci WPU syndrome. In 15 patients with WPW syndrome were performed nena RTWG and intracardiac electrophysiological research dovanie. In the control group during 40

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people walked without changes on ECG. To assess the accuracy of RTWG in defining additional ways of carrying out was used a 3-point system was called: 0 points catch - RTWG result did not match neither with EFI data, nor on top of 12-lead nasal ECG.

Reference:

1. Kushakovskiy M.S. Cardiac arrhyth- mias. Abnormal heart rhythm and conduction. St. Petersburg: Foliant; 2004

2. Belenkov Yu.N., Oganov R.G. (eds) Cardiology: National guideline. Moscow: GEOTAR-Media; 2007

3. Belyalov F.I. Cardiac arrhythmias. Irkutsk; 2011 (in Russian).

4. Spinale F.G., Hendrick D.A., Craw- ford F.A. et al. Chronic supraven- tricular tachycardia causes ventric- ular dysfunction and subendocar- dial injury in swine. Am. J. Physiol. 1990; 259 (1, Pt 2): 218–29.

5. Spinale F.G., Tomita M., Zellner J.L. et al. Collagen remodeling and changes in LV function during development and recovery from supraventricular tachycardia. Am. J. Physiol. 1991; 261 (2, Pt 2): 308–18.

6. Zaborska B., Stec S., Flasińska K. et al. Echocardiography and tissue Doppler imaging in assessment of haemodynamics in patients with idiopathic, premature ventricular complexes. Pol. Merkur. Lekarski. 2006; 20 (117): 302–4.

7. Zipes D.P., Camm A.J., Borggrefe M. et al. ACC/AHA/ESC 2006 Gui- delines for management of patients with ventricular arrhythmias and the prevention of sudden death. Europace. 2006; 8: 746–837.

8. Roytberg G.E., Strutynskiy A.V. Internal medicine. Cardiovascular system. Moscow: Binom-press; 2007

9. Ternovoy S.K., Sinitsyn V.E. Radio- diagnostics and therapy: Tutorial. Moscow: GEOTAR-Media; 2010

10. Shiller N., Osipov M.A. Clinical echocardiography. 2nd ed. Moscow: Praktika; 2005

11. Verchenko E.G. The role of dias- tolic dysfunction of the left ventric- ular myocardium in the develop- ment of heart failure and arrhythmo- genic cardiomyopathy tachycardia in children. Vestnik aritmologii. 2003; 32: 61–9

12. Bara C., Niehaus M., Ghodsizad A. et al. Echocardiographic detection of cardiac ectopy: a possible alter- native to electrophysiological map- ping? Heart Surg. Forum. 2010; 13 (5): 324–7.

13. Yao J., Yang R., Xu D. et al. Circum- ferential myocardial contraction patterns in patients with idiopathic frequent premature ventricular complexes from the right ventricu lar outflow tract. Int. J. Cardiol. 2013; 166 (1): 166–72.

14. De Boeck B.W., Cramer M.J., Loh P., Doevendans P.A. Images in cardio- vascular medicine. Two-dimension- al strain imaging to assess the origin and extent of ventricular preexcita- tion associated with an accessory bypass. Circulation. 2006; 113 (22): 835–9.

15. Aquaro D.G., Pingitore A., Strata E. Cardiac magnetic resonance pre- dicts outcome in patients with pre- mature ventricular complexes of left bundle branch block morpholo- gy. J. Am. Coll. Cardiol. 2010; 56 (15): 1235–43.

16. Ilg K., Baman T.S., Gupta S.K. et al. Assessment of radiofrequency abla- tion lesions by CMR imaging after ablation of idiopathic ventricular arrhythmias. JACC Cardiovasc.

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Imaging. 2010; 3 (3): 278–85.

17. Hasdemir C., Yuksel A., Camli D. et al. Late gadolinium enhancement CMR in patients with tachycardia- induced cardiomyopathy caused by idiopathic ventricular arrhythmias. Pacing. Clin. Electrophysiol. 2012; 35 (4): 465–70.

18. Kjaer A., Lebech A.M., Hesse B., Petersen C.L. Right-sided cardiac function in healthy volunteers mea- sured by first-pass radionuclide ventriculography and gated blood- pool SPECT: comparison with cine MRI. Clin. Physiol. Funct. Imaging. 2005; 25 (6): 344–9.

19. Zavadovskiy K.V., Kovalev I.A., Chernyshev A.A., Saushkin V.V., Po- pov S.V., Lishmanov Yu.B. Poten- tialities of quantitative blood pool single photon emission computed tomography for assessment of me- chanic myocardial dyssynchrony and intracardiac hemodynamics in ventricular arrhytmias in pediatric patients. Vestnik aritmologii. 2010; 60: 37–42 (in Russian).

20. Zavadovskiy K.V., Kovalev I.A., Chernyshev A.A., Saushkin V.V., Lishmanov Yu.B. Scintigraphic diagnosis of right heart dysfunction in children with ventricular tachy- cardia. Radiologiya – praktika. 2011; 5: 34–44

21. Botvinick E.H., O'Connell J.W., Kadkade P.P. et al. Potential added value of three- dimensional recon- struction and display of single pho- ton emission computed tomograph- ic gated blood pool images. J. Nucl. Cardiol. 1998; 5 (3): 245–55.

22. Shlevkov N.B., Bakalov S.A., Pa- sha S.P. et al. Contractility Indica- tors of left ventricular myocardial segments corresponding to the topography of arrhythmogenic zones – highly specific markers test results of antiarrhythmic drugs in patients with paroxysmal ventricu- lar tachycardia. Vestnik aritmologii. 2007; 49: 14–24

23. Rouzet F., Algalarrondo V., Burg S. et al. Contraction delay of the RV outflow tract in patients with Brugada syndrome is dependent on the spontaneous ST-segment eleva- tion pattern. Heart Rhythm. 2011; 8 (12): 1905–12.

24. Toussaint J.F., Lavergne T., Kerrou K. et al. Basal asynchrony and resyn- chronization with biventricular pacing predict long-term improve- ment of LV function in heart failure patients. Pacing. Clin. Electro- physiol. 2003; 26 (9): 1815–23.

25. Harel F., Finnerty V., Gregoire J. et al. Comparison of left ventricular contraction homogeneity index imaging and planar phase analysis. J. Nucl. Cardiol. 2008; 15: 80–5. using SPECT gated blood pool

26. Vilain D., Daou D., Casset-Senon D. et al. Optimal 3-dimensional method for right and left ventricular Fou- rier phase analysis in electrocardio- graphy-gated blood-pool SPECT. J. Nucl. Cardiol. 2001; 8: 371–8.

27. Le Guludec D., Gauthier H., Por- cher R. et al. Prognostic value of radionuclide angiography in pati- ents with right ventricular arrhyth- mias. Circulation. 2001; 103 (15): 1972–6.

28. Trimble M.A., Borges-Neto S., Smallheiser S. et al. Evaluation of left ventricular mechanical dyssyn- chrony as determined by phase analysis of ECG-gated SPECT myocardial perfusion imaging in patients with left ventricular dysfunction and conduction distur- bances. J. Nucl. Cardiol. 2007; 14: 298–307.

29. Trimble M.A., Borges-Neto S., Ho- neycutt E.F. et al. Evaluation of me- chanical dyssynchrony and myo- cardial perfusion using phase analy- sis of gated SPECT imaging in patients with left ventricular dys- function. J. Nucl. Cardiol. 2008; 15: 663–70.

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30. Mariano-Goulart D., Déchaux L., Rouzet F. et al. Diagnosis of diffuse and localized arrhythmogenic right ventricular dysplasia by gated blood-pool SPECT. J. Nucl. Med. 2007; 48 (9): 1416–23.

31. McKenna W.J., Thiene G., Nava A. et al. Diagnosis of arrhythmogenic right ventricular dysplasia/car- diomyopathy. Task Force of the Working Group Myocardial and Pericardial Disease of the Euro- pean Society of Cardiology and of the Scientific Council on Cardio- myopathies of the International Society and Federation of Car- diology. Br. Heart J. 1994; 71: 215–8.

32. Itti R., Casset D., Philippe L. et al. Characterization of right or left ventricular contraction heteroge- neity using Fourier phase analysis. Eur. J. Nucl. Med. 1988; 14: 196–202.

33. Casset-Senon D., Babuty D., Alison D. et al. Delayed contrac- tion area responsible for sustained ventricular tachycardia in an arrhythmogenic right ventricular cardiomyopathy: demonstration by Fourier analysis of SPECT equilib- rium radionuclide angiography.
J. Nucl. Cardiol. 2000; 7: 539–42.

34. Casset-Senon D., Philippe L., Ba- buty D. et al. Diagnosis of arrhyth- mogenic right ventricular cardio- myopathy by Fourier analysis of gated blood pool singlephoton emi- ssion tomography. Am. J. Cardiol. 1998; 82: 1399–404.

35. Weismüller P., Clausen M., Wel- ler R. et al. Non-invasive three-di- mensional localisation of arrhyth- mogenic foci in Wolff–Parkinson– White syndrome and in ventricular tachycardia by radionuclide ven- triculography: phase analysis of double-angulated integrated single photon emission computed tomog- raphy (SPECT). Br. Heart J. 1993; 69 (3): 201–10.

36. Chevalier P., Bontemps L., Fatemi M. et al. Gated blood-pool SPECT evaluation of changes after radio- frequency catheter ablation of accessory pathways: evidence for per- sistent ventricular preexcitation despite successful therapy. J. Am. Coll. Cardiol. 1999; 34 (6): 1839–46.

37. Zavadovskiy K.V., Pan'kova A.N., Saushkin V.V., Lishmanov Yu.B. Methodological features of gated blood pool spect data acquisition, imaging processing and results interpretation. Radiologiya–prakti- ka. 2011; 6: 75–83

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