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Individualization of ventricular extrasystoles pharmacotherapy in patients without cardiac structural changes

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Objective. *To assess the analysis of ventricular extrasystoles (VEs) as the method for individualization of VE pharmacotherapy in patients without cardiac structural changes.*

Materials and methods. *The study included 248 patients aged from 20 to 43 years without cardiac structural changes with IV–V classes of VEs according to B. Rayn classification (1984). VE antiarrhythmic therapy was selected individually, its effectiveness was assessed using daily electrocardiogram. VEs were analyzed according to generally accepted criteria, including the duration of VEs and sinus rhythm QRS complex duration (QRSve and QRSsr). The endpoint was the duration of antiarrhythmic therapy positive effect on the VEs.*

Results. *29.84 % of patients had the greatest positive antiarrhythmic effect of VEs therapy when using class II of antiarrhythmic drugs, 43.95 % — class I, the rest — class III. Positive predictive value of class III antiarrhythmic*

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drugs with QRSve complex duration ≥ 160 ms was 89.23 %, class II –QRSve ≤ 159 ms was 95.63 %. 22.58 % of patients had positive antiarrhythmic effect during 1 year of follow-up (0.86 ± 0.05 years on average), the rest — from 1 to 5 years (3.71 ± 0.11 years on average). The duration of VEs therapy positive effect using class III antiarrhythmic drugs for 1 year correlated with QRSve complex duration ≤ 165 ms (r = 0.91), while classes I and II — QRSve ≤ 145 ms (r = 0, 92).

Conclusion. *All patients without cardiac structural changes, when choosing antiarrhythmic therapy for VE treatment, should consider the duration of QRS. The duration of VEs treatment positive effect during 1 year highly correlated with (at r > 0.90) class III antiarrhythmic drugs, with QRSve duration ≤ 165 ms, classes I and II — with QRSve ≤ 145 ms.*

Key words: *ventricular extrasystoles, individualization of ventricular extrasystoles pharmacotherapy.*

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Introduction

Currently, patients with frequent and stable ventricular extrasystoles (VEs), including patients without cardiac structural changes, in order to select an effective VE pharmacotherapy undergo antiarrhythmic drugs titration that includes an assessment of the frequency and nature of premature complexes according to daily electrocardiogram (ECG) monitoring before and after antiarrhythmic medication intake in medium therapeutic dose for at least 4–5 days [1,2]. However, the definition of VE differentiated antiarrhythmic therapy depending on the nature of premature ventricular complexes in patients without cardiac structural changes has not been given according to the literature available.

Objective of the study — to assess the analysis of ventricular extrasystoles (VEs) as the method for individualization of VE pharmacotherapy in patients without cardiac structural changes.

Materials and methods

The study included 248 patients aged from 20 to 43 years (average age 29.6 ± 0.8 years) — 129 (52.02 %) women and 119 (47.98 %) men (p > 0.05). Inclusion criteria were: the absence of cardiac structural changes, sinus rhythm, the III–V classes of VEs according B. Rayn classification (1984) [1], the sensation of irregular heartbeat, chronic heart failure I–II NYHA class and the presence of signed informed consent to participate in research. The absence of cardiac structural changes was established after the exclusion of cardiac and extracardiac diseases, electrolyte imbalance, the use of medications and /or toxic substances (primarily diuretics, oral contraceptives, alcohol abuse, etc.) that independently or indirectly lead to the development of VEs [3].

In addition to physical examination, all the patients underwent 1–3-day ECG monitoring and an echocardiographic study using the Hitachi EUB-5500 apparatus according to common methods. The calculation of indicators such as the left ventricular ejection fraction (LV EF), left atrium end diastolic volume index, left ventricular mass index, the ratio of peak velocity blood flow from left ventricular relaxation in early diastole (the E wave) to peak velocity flow in late diastole (the A wave) were described previously [3, 4].

VEs analysis was carried out according to generally accepted criteria, including determining the duration of VE and sinus rhythm QRS complexes (QRSve and QRSsr.), the pre-ectopic interval of ventricular ectopy, etc. using a Poly-Spectrum digital electrocardiograph (Neurosoft, Ivanovo) at ECG recording speed of 100–200 mm/sec [1, 3, 4]. In all patients, the risk index of the development of life-threatening ventricular arrhythmias (LTVA) was calculated [3] by the formula: LTVAR = A ÷ B, where LTVAR is LTVA risk in units, A — linear deviation (LD) of corrected pre-ectopic interval PEIcor VE (ms) for at least 20 ventricular extrasystoles, calculated separately for left ventricular extrasystoles (LVE) and right ventricular extrasystoles (RVE), and B — analyzed ventricular extrasystole number (per hour). LTVAR < 0.5 could be a marker of high LTVA risk [1,3].

After daily monitoring of ECG all the patients had cardioprotective therapy, including potassium, sedation therapy, polyunsaturated fatty acids (VITRUM cardio Omega 3, Unifarm, etc.), to eliminate VEs [3]. In case of no effect, differentiation of VE antiarrhythmic therapy was carried out using I–III classes antiarrhythmic agents testing in medium therapeutic doses. When selecting antiarrhythmic medication in order to eliminate VEs in patients with-

Table 1. **The state of hemodynamics, some clinical parameters in groups I, II and III when included in the study (M±m, in brackets — 95% confidence interval of average values)**

Groups of patients / Parameters	Group I n=74	Group II n=109	Group III n=65
Age, years	30,1±1,3 (22–43)	29,9±0,9 (21–42)	28,9±1,2 (20–41)
BMI, kg/m^2	22,3±0,4 (20–24)	22,1±0,1 (19–23)	21,9±0,1 (19–25)
LV EF, %	53,86±0,88 (48–59)	53,12±0,78 (47–61)	54,12±0,78 (47–61)
E/A, units	1,19±0,01 (1,12–1,21)	1,20±0,01 (1,14–1,23)	1,21±0,01 (1,17–1,24)
LA EDVI, ml/m^2	23,56±0,72 (17–31)	23,24±0,69 (18–30)	23,24±0,64 (18–29)
LVMI, g/m^2	86,7±1,6 (74–99)	85,3±1,7 (72–101)	86,3±1,7 (72–101)
The number of VEs during 24hour-follow-up	18 900±2450 (5870–30 730)	18 990±2190 (4980–31 700)	19 890±1970 (5980–32 900)
QRSve, ms	142±2 (125–155)	144±2 (130–159)	179±3 (155–195)*†
QRSsr, ms	92±1 (80–99)	93±1 (89–98)	102±1 (95–108)*†
QRSve/QRSsr	1,54±0,02 (1,42–1,57)	1,55±0,01 (1,46–1,63)	1,74±3 (1,61–1,82)*†
LTVAR, units	0,23±0,02 (0,05–0,41)	0,21±0,02 (0,06–0,42)	0,07±0,01 (0,01–0,24)*†

Comment: BMI — body mass index, LA EDVI — left atrium end diastolic volume index, LVMI — left ventricular mass index
* the differences are significant compared with group I, † — group III compared with group II (p<0,05).

out cardiac structural changes we noted: the character of ectopic beats, its prognostic assessment, the presence of contraindications and possible development of adverse effects [1,3]. Initially, patients were prescribed class II antiarrhythmic drugs, in case of its ineffectiveness — class I or III medications, amiodarone was the last medication to be used. We used metoprolol — 50–100 mg/day, propranolol — 80–160 mg/day, allapinin — 50–75 mg/day, moracizine — 50–100 mg/day, ethacizine — 100–150 mg / day, sotalol — 160–240 mg/day, propafenone — 300–600 mg/day and amiodarone — 600–800 mg/day. The duration of antiarrhythmic therapy was at least 4–5 days, and 8 (10) days for amiodarone. Each subsequent medication was prescribed, after at least 5 half-lives of the previous one [1,3]. All the patients underwent daily ECG monitoring before and after antiarrhythmic therapy, the positive effect criteria included the frequency of extrasystoles decrease over 75% compared with its initial level and the elimination of paired and group extrasystoles [1, 2, 3]. All the patients underwent daily ECG monitoring initially and once in 3–4 days during 7–14 days of antiarrhythmic therapy in order to exclude its arrhythmogenic effect, especially when using Ic class antiarrhythmic agents [1,2,3].

The duration of follow-up ranged from 1 year to 5 years. The observation endpoint was the duration of preserved positive antiarrhythmic effect of the therapy. All the studies, including daily ECG monitoring, were carried out at least once per 3–4 months, monitoring of patients' condition and ECG registration — once a month. Patients performed regular monitoring of their blood pressure and heart rate themselves. Statistical processing of the results was carried out using Student's t-test and χ^2 test and using Statistica 11.0 software.

Results

Metoprolol was the most effective in 43 (17.34%) patients, propranolol in 31 (12.50%), ethacizine in 34 (13.71%), allapinin in 20 (8.06%), propafenone in 55 (22.18%), sotalol in 52 (20.97%) and amiodarone — in the rest. Patients were divided into three groups. 74 (29.84%) patients had the most positive antiarrhythmic effect when using class II agents (group I), 109 (43.95%) patients — class I (group II), and the rest — class III (group III). 17 (22.97%), 25 (22.94%), and 16 (24.62%) patients of groups I, II, and III, respectively, had from 6% to 15%, and the rest over 15% of total ventricular complexes number per day of observation, respectively (p> 0.05). 19 (25.68%), 29 (26.61%) and 18 (27.69%) patients of groups I, II and III, respectively, had episodes of unstable ventricular tachycardia (p> 0.05). 34 (40.48%), 51 (46.79%) and 31 (47.69%) patients of groups I, II and III, respectively, had LVE, in the rest — RVE (p> 0.05), 31 (41.89%), 44 (40.37%) and 27 (41.54%) patients — polymorphic, the rest — monomorphic VEs (p <0.05). After the inclusion in the study, patients from group III showed significantly longer QRSve complex, QRSsr, QRSve / QRSsr ratio, as well as significantly lower LTVAR compared with groups I and II, while there were no significant differences in gender and age, the state of hemodynamics, body mass index, the number of ventricular extrasystoles per day of observation in patients from groups I, II and III (Table 1).

Table 2. **The state of QRSve, QRSve / QRSsr ratio in patients of groups I, II, and III, with the duration of positive VE therapy effect for over (A) and less than a year (B) (M±m, in brackets — 95% confidence interval of average values)**

Groups pf patients	Group I		Group II		Group III	
Parameters	A n=57	B n=17	A n=82	B n=27	A n=53	B n=12
QRSve, ms	137±2 (125–145)	148±2* (140–155)	139±1 (130–145)	152±2* (140–160)	162±1 (155–165)	183±2* (160–195)
QRSve/ QRSsr.	1.45±0.01 (1.42–1.48)	1.51±0.01* (1.46–1.57)	1.46±0.01 (1.44–1.49)	1.57±0.01* (1.48–1.63)	1.63±0.01 (1.61–1.66)	1.72±0.01* (1.64–1.81)
LTVAR, units	0.92±0.08 (0.62–1.21)	2.94±0.14* (1.12–4.57)	0.84±0.07 (0.64–1.43)	2.93±0.07* (1.37–4.63)	0.85±0.12 (0.31–1.36)	2.67±0.18* (1.24–4.41)

* The differences are significant compared with the duration of positive VE therapy effect for over a year (A) ($p < 0.05$).

The number of premature ventricular complexes compared with initial data decreased from 76% to 92% (82 ± 2% on average), from 77% to 96% (average 84 ± 1%) and from 75% to 98% (an average of 83 ± 2%) ($p > 0.05$), in patients from groups I, II and III, respectively, after choosing the most effective VE therapy. LTVAR increased from 0.23 ± 0.02 units to 2.71 ± 0.32 units ($p < 0.05$), from 0.21 ± 0.02 to 2.84 ± 0.36 ($p < 0.05$), from 0.07 ± 0.01 to 2.43 ± 0.24. ($p < 0.05$) in patients of these groups, respectively. Decreased number of VEs after choosing an effective therapy negatively correlated with LTVAR increase ($r = -0.94$). The positive effect of VE therapy with class III antiarrhythmic agents highly correlated with the duration of the QRSve complex ≥ 160 ms and the QRSve / QRSsr ratio ≥ 1.6 units ($r = 0.94$ and $r = 0.92$, respectively), while with classes I and II — with QRSve ≤ 159 ms and the QRSve / QRSsr ratio ≤ 1.59 units ($r = 0.96$ and $r = 0.94$, respectively). Sensitivity, specificity and positive prognostic significance of class III agents positive effect with QRSve duration ≥ 160 ms and QRSve / QRSsr ratio ≥ 1.6 units amounted to 90.28%, 95.81% and 89.23%, respectively, and class II — QRSve ≤ 159 ms and the QRSve / QRSsr ratio ≤ 1.59–94.54%, 85.29% and 95.63%, respectively. Positive antiarrhythmic effect of VE therapy highly correlated with LD PEICor VE ≥ 11 ms ($r = 0.88$) in patients from groups I and II, while in group III — ≤ 10 ms ($r = 0.84$).

17 (22.47%), 27 (24.77%), and 12 (18.46%) patients from groups I, II, and III, respectively, had persisted positive VE therapy effect for 1 year (0.81±0, 05, 0.86±0.05, 0.92±0.05 years on average, respectively), in the rest of patients — from 1 year to 5 years (3.5±0.09, 3.7±0, 11 and 3.9±0.12 years on average, respectively) ($p < 0.05$). Patients with the duration of the antiarrhythmic effect over 1 year from groups I, II, and III had significantly less QRSve complex duration and QRSve/QRSsr ratio, as well as significantly higher LTVAR (Table 2). The duration of VE preserved positive effect during class III antiarrhythmic drugs therapy for over 1 year correlated with QRSve complex duration ≤ 165 ms and the ratio of QRSve / QRSsr. ≥ 1.66 ($r = 0.91$ and $r = 0.89$, respectively), while classes I and II — QRSve ≤ 145 ms and the QRSve / QRSsr ratio ≤ 1.49 ($r = 0.92$ and $r = 0.90$, respectively).

Discussion

Ventricular heart rhythm disturbances including VE management is one of the most complex problem that often prevent the development of life-threatening arrythmias including ventricular tachycardia and ventricular fibrillation [1,2]. Despite the favorable prognosis of VE in patients without cardiac structural changes according to B. Bigger (1984) classification [1], this category of patients needs VE antiarrhythmic therapy in case of subjective sensations of extrasystoles, which affect life quality, and prevention of arrhythmogenic cardiomyopathies and fatal arrythmias [1, 2, 3, 5].

The study included 248 patients aged from 20 to 43 years (average age 29.6±0.8 years). Inclusion criteria were: the absence of cardiac structural changes, sinus rhythm, VE III–V classes according to the classification of B. Rayn (1984) [1], the sensation of irregular heartbeat, chronic heart failure I–II NYHA classes, the presence of signed informed consent to participate in research. The absence of cardiac structural changes was established after exclusion of cardiac and extracardiac diseases, electrolyte imbalance, the use of medications and /or toxic substances that independently or indirectly lead to the development of VEs [3].

In 23,39% of the examined patients, VE comprised 6% to 15% of the total ventricular complexes per day. The rest of patients had over 15% of VE per day. 26.61% of patients had episodes of unstable ventricular tachycardia. 41.12% of patients had polymorphic and the rest — monomorphic VEs.

Nowadays radiofrequency ablation of arrhythmogenic focus is indicated in patients without cardiac

structural changes, with over 15 % of VE of total ventricular complexes number, especially in patients without antiarrhythmic therapy effect or when patient refuses to intake antiarrhythmic therapy [1,2]. This term was the basis for pharmacological antiarrhythmic therapy in patients included in the study.

All the patients underwent fatal ventricular arrythmias risk estimation using LTVAR as LD PEICor VE to the number of VE used for research (VE per hour) ratio [3, 4]. All the patients included in the study had LTVAR index < 0.5 units that indicated high risk of life-threatening ventricular arrythmias [3, 4].

In this study we used antiarrhythmic medications testing in order to select VE antiarrhythmic therapy for all patients [1]. Initially, patients were prescribed class II antiarrhythmic drugs, in case of its ineffectiveness — classes I or III drugs were prescribed, amiodarone was the last medication to be used. All the patients underwent daily ECG monitoring before and after antiarrhythmic therapy, the positive effect criteria included the frequency of extrasystoles decrease over 75 % compared with its initial level and the elimination of paired and group extrasystoles [1, 2, 3]. The duration of antiarrhythmic therapy was at least 4–5 days, and in the case amiodarone — 8 (10) days. After the inclusion in the study, the follow up ranged from 1 to 5 years. The observation endpoint was preserved positive effect of antiarrhythmic therapy.

29.84 % of patients had the greatest positive antiarrhythmic effect of VE therapy during class II antiarrhythmic agents' therapy, 43.95 % — class I, the rest — class III. The positive result of VEs therapy with class III antiarrhythmic agents highly correlated with QRSve complex duration ⩾ 160 ms and the QRSve / QRSsr ratio ⩾ 1.6 units (r = 0.94 and r = 0.92, respectively), while classes I and II — with QRSve ⩽ 159 ms and the QRSve / QRSsr ratio ⩽ 1.59 units (r = 0.96 and r = 0.94, respectively). Positive prognostic significance of class III antiarrhythmic medications positive effect with the duration of QRSve complex ⩾ 160 ms and QRSve / QRSsr ratio ⩾ 1.6 units was 89.23 %, and the significance of classes I and II with QRSve ⩽ 159 ms and the QRSve / QRSsr ratio ⩽ 1.59–95.63 %. The data obtained, apparently, should be taken into account when choosing differential VE therapy in patients without cardiac structural changes.

Nowadays the QRS complex duration over 140 ms is considered one of the arrhythmogenic cardiomyopathy development predictors in patients without cardiac structural changes, and the significance of this indicator directly correlates with QRSsr duration increase. [5,6,7]. The cause of QRS complex expansion in this category of patients has not been studied yet, however, most authors claim that the increase of QRS duration is associated with "oxidative stress" in cardiomyocytes, hyperpolarization of myocardial cell membranes, cardiac excitation slowdown, cardiac fibrosis, etc. [5,6,7,8].

All examined patients had negative correlation between decreased VE frequency after choosing an effective VE therapy and LTVAR increase (r = –0.94). Therefore, this index can be used as additional criterion for VE therapy effectiveness evaluation.

LTVAR was proposed to assess the risk of fatal ventricular arrhythmias development, its increase was associated with decreased risk of fatal arrhythmias and/or effectiveness of antiarrhythmic therapy, and vice versa [3,4]. Similar principle was proposed for the detection of atrial fibrillation using the risk index for the development of this arrhythmia in patients with atrial extrasystoles. The increase of this indicator during antiarrhythmic therapy compared with initial data was associated with positive therapy effect, used for the atrial fibrillation primary prevention [9,10]. LTVAR had similar changes in positive antiarrhythmic VE therapy effect assessment according to data obtained in this study.

Positive antiarrhythmic effect persisted for 1 year in 22.58 % of patients (0.86 ± 0.05 years on average), from 1 year to 5 years in the rest (3.71 ± 0.11 years on average). The duration of preserved VE therapy positive effect using class III antiarrhythmic drugs for over 1 year correlated with the duration of the QRSve complex ⩽ 165 ms and the QRSve / QRSsr. ratio ⩾ 1.66 (r = 0.91 and r = 0.89, respectively), while when using classes I and II — QRSve ⩽ 145 ms and the QRSve / QRSsr ratio ⩽ 1.49 (r = 0.92 and r = 0.90, respectively). It is remarkable that the decrease of premature ventricular complexes number compared with initial data after choosing the most effective VE therapy, regardless of the class of medication — I, II and III, did not differ significantly and averaged 83 %. This shows that the decrease of ventricular extrasystoles number detected during antiarrhythmic drugs testing does not determine the duration of preserved VE positive effect.

Previously obtained data showed that LTVAR increase two or more times compared with the initial data after second and/or third intake of antiarrhythmic medications determines one or more potentially effective antiarrhythmic agents [11]. Subsequently, medication with predicted positive antiarrhythmic

effect duration, including according to data obtained in this study for one year or more, should be used as long-term VE therapy in patients without cardiac structural changes. The above hypothesis will be the subject of further research.

According to the results, positive clinical effect of class II drugs usage highly correlated with LD PEICor VE ≥ 11 ms (r=0.88), while I, III classes and a combination of classes II and I — ≤ 10 ms (r=0.84). These data are notable for patients without cardiac structural changes when choosing differentiated VE antiarrhythmic therapy.

Many previous clinical and experimental studies have shown that identified indicators of LD PEICor VEs, for example, ≤ 10 ms, indirectly confirm the mechanism of "re-entry" and/or the formation of pathological ectopic focus, and the large variability of this indicator — the presence of trigger mechanisms [4]. Therefore, after several antiarrhythmic agents intake, in the presence of trigger mechanisms, cardiomyocytes membrane hyperpolarization decreases that manifests as PEICor increase, then — VE frequency decrease, and after the formation of excitation waves, for example, by "re-entry" mechanism, it fractionizes and divides into two waves that become independent that leads to the appearance of various PEICor premature complexes on ECG and then, when instead of a unilateral block, complete block develops, ectopy stops or its decrease is observed [1,4].
The duration of positive VE antiarrhythmic therapy effect in patients without cardiac structural changes for less than a year can be explained by, firstly, trigger mechanisms transformation (early or delayed afterdepolarization) of ventricular ectopy development, for example, into "re-entry" and vice versa [1], secondly, ion channels damage and / or decreased sensitivity of cardiomyocyte receptors to antiarrhythmic agents, in particular, agents with sympatholytic effect due to "oxidative stress" [1,5,6.7,8], thirdly, premature ventricular complexes might appear before latent myocarditis, cardiomyopathy, arrhythmogenic right ventricular dysplasia development, etc., and pharmacotherapy of these diseases is mainly ineffective or has short-term positive result [1]. Therefore, in patients without cardiac structural changes, radiofrequency ablation of the arrhythmogenic focus is the method of ventricular ectopia treatment in predicting the effectiveness of VE pharmacological antiarrhythmic therapy for less than a year, especially in patients with over 15% extrasystoles of total ventricular complexes, as well as with arrhythmogenic cardiomyopathy and life-threatening ventricular arrhythmias predictors [1,2,6].

Conclusion

All patients without cardiac structural changes, when choosing antiarrhythmic therapy for VE treatment, should consider the duration of QRSve. Positive prognostic significance of class III antiarrhythmic drugs with VEs QRS complex duration ≥ 160 ms was 89.23%, class II –QRSve ≤ 159 ms was 95.63%. 22.58% of patients had positive antiarrhythmic effect during 1 year of follow-up (0.86±0.05 years on average), the rest — from 1 to 5 years (3.71±0.11 years on average). The duration of VE therapy positive effect using class III antiarrhythmic drugs for 1 year correlated with QRS complex duration ≤ 165 ms (r=0.91), while classes I and II — QRSve ≤ 145 ms (r=0, 92). The degree of ventricular extrasystoles frequency decrease detected during antiarrhythmic agents testing does not correlate with the duration of VE therapy positive effect in patients without cardiac structural changes.

We have concluded that:

1. Positive prognostic significance of class III antiarrhythmic drugs with QRSve duration ≥ 160 ms and a QRSve / QRSsr ratio ≥ 1.6 was 89.23%, class II — with QRSve ≤ 159 ms and the QRSve / QRSsr. ratio ≤ 1.59– 95.63%.

2. 22.58% of patients had positive antiarrhythmic effect during 1 year of follow-up (0.86±0.05 years on average), the rest — from 1 to 5 years (3.71±0.11 years on average).

3. The duration of VEs therapy positive effect using class III antiarrhythmic drugs for 1 year correlated with QRS complex duration ≤ 165 ms and the QRSve / QRSsr. ≥ 1.66 ratio (r=0.91 and r=0.89, respectively) (r=0.91), while classes I and II — QRSve ≤ 145 ms and QRSve / QRSsr. ratio ≤ 1.49 (r=0.92 and r=0.90, respectively).

4. The degree of ventricular extrasystoles number decrease detected during antiarrhythmic agents testing does not correlate with the duration of VE therapy positive effect in patients without cardiac structural changes.

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References

1. Braunwald's Heart Disease. A textbook of cardiovascular medicine. 11th ed. Zipes D.P., Libby P., Bonow R.O. et al., Phyladelfhia, W.B. Saunders Company; 2018.-2040 p.
2. Al-Khatib S.M., Stevenson W.G., Ackerman M.J. et al. 2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol., 2018; 72 (14): 1677–1749.
3. Olesin A.I., Koziy A.V., Semenova E.V. et al. Clinical assessment of life-threatening ventricular arrhythmia predictor in patients with ventricular exstrasystolia and no morphological heart pathology (a prospective study). Russian Journal of Cardiology. 2010;(1): 5–Russian.
4. Olesin A.I., Konovalova O.A., Koziy A.V. et al. Ventricular extrasystolia in patients with non-ST elevation acute coronary syndrome: assessing the risk of life-threatening ventricular arrhythmias (clinico-experimental study). Russian Journal of Cardiology, 2009;1:24–Russian.
5. Panizo J.G., Barra S., Mellor G. et al. Premature Ventricular Complex-induced Cardiomyopathy. Arrhythm. Electrophysiol. Rev., 2018; 7 (2): 128–134.
6. Wang Y., Eltit J.M., Kaszala K. et al. Cellular mechanism of premature ventricular contraction-induced cardiomyopathy. Heart Rhytm, 2014; 11 (11): 2064–2072.
7. Carballeira P.L., Deyell M.W., Frankel D.S. et al. Ventricular premature depolarization QRS duration as a new marker of risk for the development of ventricular premature depolarization-induced cargiomyopathy. Heart Rhytm 2014; 11 (2): 299–306.
8. Sovari A.A. Cellular and molecular mechanisms of arrhythmia by oxidative stress. Cardiol. Res. Pract., 2016; 2016: 9656 078.
9. Olesin A.I., Litvinenko V.A., Shlapakova A.V., Konstantinova I.V. Assessment of the risk of developing atrial fibrillation in patients with metabolic syndrome in the recording of atrial extrasystole. International Journal of Heart and Vascular Diseases. 2016; 4 (11): 25–Russian.
10. Olesin A.I., Litvinenko V.A., Shlapakova A.V., Konstantinova I.V., Zhyeva Y.S. Antiarrhythmic drug therapy possibilities for primary prevention of atrial fibrillation in patients with metabolic syndrome and premature atrial contractions: a prospective study. International Journal of Heart and Vascular Diseases. 2019; 7 (22): 29–Russian.
11. Olesin A.I., Konstantinova I.V., Litvinenko V.A., Zueva J.S. The method of choosing the most effective antiarrhythmic drug for patients with extrasystole. Patent RU № 2707 261, publ. 25.11.2019, Bul. № 33. — 33 p. Russian.