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Prevalence and Etiological Factors of Cardiac Rhythm and Conduction Disorders Among Those Seeking Medical Care From a Cardiologist at the Outpatient Stage

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Abstract: The study included 652 patients with persistent rhythm and conduction disturbances who consulted a consultative and diagnostic polyclinic cardiologist for 2 years. Possible etiological factors of arrhythmias occurrence in the examined patients were revealed. In 48 (8.84%) patients no visible causes of rhythm disturbances were revealed. This group of patients underwent magnetic resonance imaging (MRI) of the heart to clarify the nature of arrhythmias. In 32 patients cardiac MRI allowed to determine the probable cause of cardiac rhythm disturbances, and the high frequency of myocarditis signs detection at MRI (⅓ of patients examined) is noteworthy

Keywords: Rhythm and conduction disorders, aetiology of arrhythmias, idiopathic rhythm disorders, cardiac magnetic resonance imaging.

Introduction

Heart rhythm disorders are now observed worldwide and have become an important medical and social problem in countries. Rhythm disturbances are so great that they are an important factor in the development of a number of diseases.

By solving the problem of malignant tumours, the average life expectancy of people

by one year, and by addressing arrhythmias, life expectancy is increased by four years.

Cardiac arrhythmias are a global epidemic, and in the last 30 years.

prevalence has doubled.

In Russia, >24% of the population is overweight. It is proven that an increase in body mass index (BMI) by 5 kg/m2 increases the risk of heart rhythm disorders by 30%. During a year 1300 thousand people die of cardiovascular diseases (CVD) in Russia, arrhythmic deaths occur in more than 100 thousand people [1]. Heart rhythm disorders (HRD) are one of the causes of mortality and disability in patients with CVD. In this regard, the problem of cardiac rhythm disturbances remains topical. Cardiac rhythm disturbances are often found in people of different ages, among healthy people and people suffering from various diseases [2]. Meanwhile, the prevalence of various LDCs at the initial medical care at the outpatient stage, the structure of various types of LDCs in the total number of visits, as well as the predominant etiological factors are insufficiently studied. Among the diagnostic methods of arrhythmia investigation, in addition to electrocardiography, daily electrocardiogram (ECG) monitoring and stressmethods, electrophysiological study is becoming increasingly relevant. However, it cannot always answer the question about the etiological nature of LDC. In this aspect, some researchers attach special importance to noninvasive imaging methods [3], including echocardiography (ECG), myocardial scintigraphy, computed tomography-chest angiography, and cardiac magnetic resonance imaging (MRI). Cardiac MRI shows promise, especially in cases of so-called idiopathic LDCs. There is anecdotal evidence that MRI allows risk stratification in patients with IHD [4], which is important for timely intervention in patients with unfavourable prognosis. Cardiac MRI has become a highly sensitive and specific tool for the diagnosis of myocarditis. MRI has a unique potential to detect structural changes characteristic of myocarditis, such as intracellular oedema, increased capillary permeability, hyperaemia and, in more severe cases, myocardial ‘honeycomb’ necrosis with

subsequent tissue fibrosis [5]. The diagnostic value of cardiac MRI with contrast in detecting myocarditis is about 80% [6].

Purpose of the study: to determine the prevalence of cardiac rhythm and conduction disorders, their structure and etiological factors in the total number of visits to a cardiologist, to identify a group of patients with idiopathic LDCs.

Material and methods: 652 patients with persistent cardiac rhythm and conduction disorders aged 17 to 89 years (mean age was 67.8±15 years) were included in the study. During 2 years, 4,373 patients consulted a cardiologist of the consultative and diagnostic polyclinic. All of them underwent electrocardiography on the day of the visit. In 652 of them, at the time of referral, one or another LDC and/or conduction were detected (recorded during ECG registration on the day of the visit, as well as on previous ECGs and Holter daily monitoring). These patients were included in the study (522 men, 130 women), which accounted for 14.9% of those who sought medical care.

Out of 652 patients, 545 patients with clinically significant LDCs during daily ECG monitoring were identified, i.e. the number of ventricular extrasystoles (VE) and supraventricular extrasystoles (SVE) exceeded the acceptable norm according to A. Dabrowski et al. [7] (individuals with bradyarrhythmias and blockades were not included in the analysis due to the small number of this group). The groups of patients were comparable in age, sex, severity of the course of the underlying disease, spectrum of concomitant pathology, and the volume of treatment.

These patients were divided into 3 groups in order to assess the frequency of ventricular and supraventricular arrhythmias:

- Group 1: 96 patients with predominant LRS of the VTE type - 80 men and 16 women, mean age 68 (18-89) years;
- Group 2: 343 patients with predominant LRS of the VTE type - 271 men and 72 women, mean age 67 (17-83) years;
- Group 3: 106 patients with combined LDC (VE and LVE) - 94 men and 12 women, mean age 65 (18-87) years. The mandatory scope of examination for a patient included medical examination, laboratory tests - clinical blood analysis, biochemical analysis (potassium, sodium, magnesium, chlorine, glucose, lipid composition, creatinine, total protein), thyroid hormones, coagulogram; instrumental studies - ECG, ECG diurnal monitoring, chest radiography, echoCG.

Обращение за медицинской помощью

Indicator	Total	Abs. Number	%	Abs. number	%	Abs. number	%
NJE	371	234	56,9	137	35,9	137	21
NJE	357	313	54,8	44	6,8	44	6,8
Atrial fibrillation	299	39	6	260	39,9	260	39,9
Paroxysmal LVAD	163	91	14	72	11,04	72	11,04
Paroxysmal VT	52	45	6,9	7	1,07	7	1,07
Atrioventricular blockade							
• I	80	26	4	54	8,3	54	8,3
• II	17	6	0,92	11	1,7	11	1,7
• III	8	2	0,3	6	0,92	6	0,92
• СССУ	65	5	0,77	60	9,2	60	9,2
Intraventricular blockade	273	24	3,68	249	38,1	249	38,1
QT interval prolongation	3	3	0,46	0	0	0	0

SVE, supraventricular extrasystoles; VE, ventricular extrasystoles; SVT, supraventricular tachycardia; VT, ventricular tachycardia; SSSS, sinus node weakness syndrome.

Results and Discussion:

An attempt to identify the leading cause of arrhythmia in patients of the examined groups showed that ischaemic heart disease (IHD) made the maximum contribution to the development of LRS (Table 2). It should be noted that in the group with predominantly supraventricular rhythm disturbances (SVRD) patients with a history of pulmonary embolism (PTE), chronic heart failure (CHF) of II-IV functional class (FC) were significantly more frequent, presence of a pacemaker, oncological diseases, hyperthyroidism, hyperkalemia and hypercholesterolemia, as well as exacerbation of gastrointestinal diseases; patients with acquired heart disease and hypercholesterolemia predominated in the group with combined LDCs, and in the group with predominantly ventricular arrhythmias (VRA) there were more patients with prosthetic aortic valve. It turned out that in the group with predominantly VRS there were significantly more male smokers with a history of CHD, and in the group with predominantly VRS there were statistically significantly more perimenopausal women.

Psych emotional stress turned out to be the main 'triggering' factor of arrhythmias. As shown in the figure, 93% of patients from the group with predominantly LVD, 87% from the group with combined LDCs, and 75.8% from the group with predominantly LVD noted the presence of acute or chronic psychoemotional overstrain at the time of seeking medical help for LDCs. Psychosocial stress is of exceptional importance in the genesis of arrhythmias [8]. Stress is an integral part of our life. The term itself (stress - pressure, tension) means a complex mental and physiological state arising in response to a variety of influences. Each of us quite often experiences a state of tension under certain circumstances. But it is not the circumstances themselves, but our reaction to them that causes stress.

In 48 examined patients (8.84%) no visible causes of LDC were detected. In these patients, CHD was excluded according to the results of echoCG (performed in 100% of patients), stress tests (bicycle ergometry was performed in 47.9%), coronarography (performed in 37.5%); congenital and acquired heart defects, conduction system anomalies (WPW-syndrome), hyper- and hypothyroidism, impaired glucose tolerance (thyroid hormones T3, T4, thyroid hormone, blood glucose were determined in 100% of patients), pheochromocytoma, acromegaly, and no symptoms of CVD (all patients underwent a 6-minute walk test). It was these patients who were referred for cardiac MRI to clarify the etiology of LDC. As is known, MRI with contrast is one of the best methods for detection of myocardial structural anomalies. The method provides reliable complex information about functional parameters of the left ventricle (LV) and right ventricle (RV); In addition, when using delayed contrast-enhanced MRI technique, it is possible to judge the state of both LV and LV myocardium [9]. Patients were divided into 2 groups: Group 1 - 23 patients with predominant LV LVEF; Group 2 - 25 patients with predominant LVEF. In 10 patients of the 1st group no pathology was detected on MRI, in 9 patients there were signs of myocarditis, in 1 patient - a single area of intramyocardial fibrosis in the middle parts of the posterior septal region and in 1 patient - an abnormal course of the anterior interventricular artery with myocardial bridge formation. Signs of noncompact myocardium were detected in 2 patients. The mean age of 13 patients with MRI changes was 55 (18-57) years old, and in patients without pathology on MRI - 53 (17-55) years. Among 25 patients of group 2 with DALYs, 17 had pathological changes on MRI. When analysing the detected changes on MRI, there were signs of myocarditis in 6, signs of hypertrophic cardiomyopathy (HCMP) in 3, local fibrosis in the region of the heart apex, probably of post-traumatic genesis, in 1. Also 2 diverticula, a zone of noncompact myocardium, local fibrosis, probably of postinfarction origin, were detected in 1 patient, and 1 patient had a diverticulum in the area of the posterior LV wall and local fibrosis in the area of the diverticulum. In 1 patient we found signs of large-focal cardiosclerosis in the basal parts of the lateral LV wall with impaired local contractility in this area and small-focal fibrosis in the area of the interventricular septum, apical sections of the posterolateral wall, middle sections of the posterior septal area, which is a manifestation of postmyocardial cardiosclerosis and LV cavity dilatation and is a sign of dilated cardiomyopathy (DCMP). Another 1 patient had signs of lipomatosis and fibrosis of the LV free wall in epicardial regions, which may be the first signs of arrhythmogenic dysplasia of the

LV (ADPV). Another 1 patient had myxomatous degeneration of mitral valve flaps with formation of posterior flap prolapse and mitral regurgitation. The mean age of patients with pathology on MRI was 55 (17-58) years, and in patients without changes on MRI - 51 (19-54) years.

Conclusions

1. The prevalence of heart rhythm disorders in the structure of visits to a cardiologist is 14.9%, the main contingent is represented by elderly and old people. 2. The leading cause of arrhythmias development was ischaemic heart disease. The predominant background disease was hypertension. In the group with predominantly supraventricular arrhythmias, patients with a history of pulmonary embolism, chronic heart failure of functional class II-IV, pacemaker, hyperthyroidism, hyperkalemia, hypercholesterolemia, oncological diseases, with exacerbation of gastrointestinal tract diseases, and there were significantly more women in perimenopause. In the group with predominantly ventricular rhythm disturbances, there were more patients with prosthetic aortic valve, and smoking men with a history of coronary heart disease were significantly more common. In the group with combined rhythm disorders, patients with acquired heart defects and hypercholesterolemia predominated. The main provoking factor of arrhythmia development was psychoemotional stress. 3. In 48 patients (8,84%) identification of arrhythmias nature according to traditional methods of investigation was difficult, in 32 patients of this category magnetic resonance imaging of the heart allowed to establish a probable cause of rhythm disturbance (⅔ of all examined patients). The high frequency of myocarditis signs detection (⅓ of patients examined) is noteworthy.

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