Research Article

Patterns of Changes in the Psycho-emotional Background in Patients with Stable Coronary Heart Disease, Complicated By Atrial Fibrillation

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Abstract

The objective is to investigate the influence of stress on the clinical and pathogenetic peculiarities of the course of stable coronary heart disease (SIHD) in conjunction with atrial fibrillation (AF).

Materials and methods. The analysis of psychodiagnostic tests, labolatory and instrumental research methods in patients with and without AF has been performed. Patients were divided into three groups: group 1 – patients with stable ischemic heart disease (SIHD) with a constant form of AF (15 patients were examined), group 2 – patients with SIHD with paroxysmal form of AF (16 patients were examined), group 3 – patients with SIHD without AF (15 patients were examined).

Results. According to the analysis of the data obtained, low level of stress was found in 6 (37.50%) patients with a permanent form of AF, whereas in patients without AF, it was observed in 1 (6.67%) person ($p_1 < 0.05$) (p_1 – the reliability of the differences in indicators relative to patients without AF). Moderate somatic disorder in women with paroxysmal AF was significantly higher than in the group of patients with a constant form of AF ($p_2 < 0.05$) (p_2 – the reliability of the differences in the indicators relative to patients with a constant form of AF). It is confirmed in patients with AF there are signs of the average stress level on the perceived stress level-10 ($p_2 < 0.05$). Among the social factors that may have an impact on health are the influence of the media, the use of alcohol by relatives, the threat of unemployment for relatives and friends. These indicators were most often found in the group of patients with AF rather than without it ($p_2 < 0.05$). Changes of ECG and echocardiographic parameters in all groups of patients were revealed.

Conclusion. The association of stress with stable ischemic heart disease combined with atrial fibrillation has shown that stress disorders are associated with an increased risk of atrial fibrillation and may worsen their course and predict the risk of developing paroxysm. The dependence between the severity of clinical manifestations, psychodiagnostic tests, laboratory methods, ECG and echocardiographic parameters of the heart on the course of atrial fibrillation is proved.

Keywords

stress; atrial fibrillation; stable ischemic heart disease; stress scale

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Problem statement and analysis of the latest research

Atrial fibrillation (AF) is a cardiovascular epidemic that affects over 1 million people in Ukraine [5, 7]. Its share reaches 1%, increases with age, reaching 9% of people over 80 years old [1, 7]. AF is a prognostically unfavorable heart rhythm disorder, which is accompanied by a 1.5-2-fold increase in total and cardiovascular mortality, the incidence of chronic

heart failure (CHF), increases the risk of developing cardioembolic stroke, hypertension, angina pectoris, difficulty in treating and lowering quality of life [7, 8]. At present, anxiety and depression disorders, levels of psychosocial stress [2], negative emotions of anger, hostility and tension [3] are independent potential risk factors for cardiovascular disease, which should be considered in combination with other commonly accepted factors of cardiovascular risk [11]. Clinical trials have been conducted to study the association of depression, anger, anxiety and chronic stress with AF incidents [3, 10]. Multinational research MESA (Multi-Ethnic Study of Atherosclerosis) confirmed the association of anxiety-depressive states with an increased risk of AF [3]. A meta-analysis of European cohort studies has shown that in patients with these conditions, they are observed in 61.4% – with ischemic heart disease (CHD), 60.4% – with arterial hypertension (AH), 53.7% with chronic heart failure, accompanied by a significant decrease in the variability of the heart rate and led to deterioration of regulatory mechanisms of the heart [5, 6, 8]. Explaining the ways in which these conditions cause AF are the autonomic nervous system, the hypothalamic-pituitary-adrenal and renin-angiotensin-aldosterone system, which explores the promising interrelationships between anxiety-depressive states and the onset of AF [1, 3, 6]. Evidence confirms the hypothetical relationship between AF pathophysiology, depression and anxiety, as systematic evaluation and treatment of these conditions can contribute to the prevention of lethal heart events in people at high risk of cardiovascular disease (CVD) [5, 6].

Objective of the study. To investigate the influence of stress on the clinical and pathogenetic features of the course of stable coronary heart disease (SIHD) in conjunction with atrial fibrillation (AF).

1. Materials and Methods

The study included 46 patients with and without AF, which were treated in the OKCS of Ivano-Frankivsk city. The age of the patients without AF and with a constant form of AF was 64.20 ± 2.96,

61.94 ± 2.43 and 63.00 ± 2.89 years, respectively ($p_{1-2} > 0.05$). Growth, weight and body mass index (BMI) in patients of the examined groups did not differ ($p_{1-2} > 0.05$). Clinical evaluation was performed on the basis of the collection of complaints, features of anamnesis of life and disease, data of objective examination of patients.

The state of the psychoemotional sphere was analyzed using the method of questioning according to the following methods and scales. The level of stress was determined according to the psychosocial stress scale of L. Rider and the perceived stress-10. To assess the presence of depressive and anxious symptoms, the hospital scale of anxiety and depression was used by the HADS. The self-esteem of health was conducted using questionnaires PHQ-15, PHQ-9. Using the scale of living standards, the quality of life of patients was diagnosed. The questionnaire for identifying social factors that may have an impact on health was studied. ECGs were performed on the MIDAS 6/12 device with registration in 12 common directions. Echocardiography with the help of the apparatus of Sanon Aplio 400. Biochemical parameters of blood (total protein, creatinine, urea, AlAT, and AsAT) were performed on a biochemical analyzer. The indices of the rolling linkage of homeostasis were studied. The system of antioxidant protection of the organism was studied by the parameters of superoxide dismutase, glutathione peroxidase spectrophotometric method. Quantitative determination of catalase by A. Bakh and S. Zubkova was carried out by titration using hydrogen peroxide, sulfuric acid, potassium permanganate, distilled water and patient blood. The activity of superoxide dismutase was determined on the apparatus of KFK-2MP, glutathione peroxidase on SPECORD M40.

The processing of the obtained results was subjected to mathematical-statistical analysis using the computer program STATISTIKA-6 and the software of the program "Microsoft Excel" using the method of the Student-Fisher. The difference between the comparative values was considered to be significant at $p < 0.05$.

2. Results and Discussion

Assessing the clinical signs of the disease, it was found that among the examined patients, both with AF and without AF, had the following complaints occurred the feeling of interruption, shortness of breath at rest, increased blood pressure (BP), increased excitability. The feeling of interruptions was noted in 9 (60.0%) patients without AF ($p_1 < 0.05$) (p_1 – the reliability of differences in indicators relative to patients without AF), 5 (93.75%) patients with permanent and 12 (80.0%) with paroxysmal AF ($p_{1-2} < 0.05$) (p_{1-2} – the reliability of the differences in the indicators relative to patients without AF and with a constant form of AF). In addition, shortness of breath in patients without AF was not observed. However, in patients with a permanent form was 4 (25.0%, $p_1 < 0.05$) and 3 (20.0%) with paroxysmal AF. The trend of progression of elevated blood pressure is investigated in all groups of patients. Thus, in patients without AF, the pressure was increased in 14 patients (93.33%), in 8 patients (50.0%) ($p_1 < 0.001$) with permanent and in 4 (26.67%) ($p_1 < 0.001$) with paroxysmal AF, which testifies to the significant reliability of the indicators, in relation to patients without it. It should be noted that increased excitability occurred in patients without AF, more often than in patients with a permanent form ($p_1 < 0.01$). Most patients have symptoms of astheno-vegetative syndrome: fatigue, memory impairment, frequent headaches, loss of appetite, loss of sense of humor, sweating, weight loss ($p_{1-2} > 0.05$). Among patients, individuals with dysfunction of the gastrointestinal tract were distinguished, the leading symptoms of which were constipation and diarrhea ($p_{1-2} > 0.05$).

It should be emphasized that the vast majority of examined patients recorded the difference between the frequency of heart rate and pulse. In 16 (100.0%) patients 1 group and 5 (33.33%) patients 2 group had available pulse deficiency ($p_2 < 0.001$). At that time, in patients 3 group there was no shortage of pulse ($p_1 < 0.05$). At examination of patients signs of acrocyanosis were detected in 4 (25.0%) persons with a permanent form of AF, in 1 (6.67%) persons with paroxysmal form of AF, in persons without AF, acrocyanosis was not observed ($p_1 < 0.05$). Almost half of patients during auscultation listened to vesicular breathing and hard breathing with moist wheezing ($p_1 < 0.05$). Patients with AF were diagnosed the heart rhythm disorders. In particular, the analysis of objective research showed that in patients with a permanent AF, irregularity of the heart was found in 16 (100.0%) subjects, compared with paroxysmal AF 5 (33.33%), respectively ($p_2 < 0.001$). There was no significant difference between the groups in patients with and without AF, in relation to tones of the heart, heart sounds and accent II of the aorta ($p_{1-2} > 0.05$). There was found difference between patients with SIHD without AF and with it in terms of liver enlargement ($p_{1-2} > 0.05$).

The results of the Rider Psychosocial Stress Scale were analyzed, according to which it was found that in 6 (37.50%) ($p_2 < 0.05$) persons of group1, in 1 (6.67%) person of group 3 ($p_1 < 0.05$) and in 1 person (6.67%) of group 2noted there were signs of a low level of stress. It has been determined that the average stress level was in 7 (46.67%) persons of group 3, in 2 (12.50 %) persons of group 1, and in 5 (33.33%) persons of group 2. The analysis established the difference between the indicators of the groups 3 and 1 ($p_1 < 0.05$). A high level of stress was noted in 2 (13.33%), 4 (25.00%) and 1 (6.67%) patients of the corresponding groups ($p_{1-2} > 0.05$). Among women, low level of stress was diagnosed in 2 (13.33%) patients without AF, in 1 (6.25%) patients with permanent and in 2 (13.33%) patients with paroxysmal AF ($p_{1-2} > 0.05$). An average level of stress was observed in 3 (20.0%) patients of group 3, in 2 (12.50%) patients of group 1 and in 4 (26.67%) patients of group 2 ($p_{1-2} > 0.05$). In the groups1 and 2, the high level of stress was 2 (12.50%) and 2 (13.33%), which exceeded the data of the group 3 ($p_{1-2} > 0.05$). The comparative characteristics of these parameters show that more than half of men have emotional states more often than women in the respective groups.

Analyzing the indicators of the perceived stress-10 scale, it was found that low and high levels of stress were absent, the mean was found in 9 (60.0%) patients without AF, in 11 (68.75%) patients with

constant AF and in 7 (46.67%) patients with paroxysmal AF (p_{1-2}>0.05) without any difference between these groups. Patients in the group 3 showed a low level of stress of 6.67% compared with the groups 1 and 2 (p_{1-2}>0.05). In the group2, the highest average level of stress was found; it was observed in 8 (53.33%) persons in relation to patients in the group 1 (p_2<0.05). Among women, the high level of stress falls on the group of patients with permanent AF – in 2 (12.50%), compared with the group of patients without AF, without a significant difference between them (p_{1-2}>0.05).

The structure of anxiety-depressive symptoms in patients with CIHS in combination with and without AF was constant in the absence of anxiety disorders in 6 (40.0%), 5 (31.25%) and 2 (20.0%) peersons, subclinical levels in 3 (20.0%), 4 (25.0%), 5 (33.33%) persons, clinical level in 1 (6.67%) respectively (p_{1-2}>0.05). The assessment of the anxiety level among women without a disorder anxiety was noted in 3 (20.0%) patients of group 3, in 2 (12.50%) patients of group 1 and in 4 (26.67%) patients of group 2, in 2 (13.33%) and 2 (12.50%) with subclinical level and with clinical in 2 (12.50%) and 1 (6.67%) (p_{1-2}>0.05), respectively. The clinical level of depression was diagnosed in men in 4 (26.67%) persons in group3, in 2 (12.50%) persons in group 1, and in 1 (6.67%) person in group 2. The highest subclinical level of depression was in the group of patients with a permanent form of AF in 5 (31.25%) persons, compared with persons without AF 1 (6.67%), but without a significant difference (p_{1-2}>0.05). Absence of disorder was observed in 5 (33.33%), 3 (18.75%), 4 (26.67%) subjects in the studied groups. At the same time, in women, 4 (26.67%) persons with paroxysmal AF were found, respectively (p_{1-2}<0.05), which testifies to the reliability of the difference between these groups. Patients with SIHD without AF had the highest subclinical level of depression among the study groups 5 (33.33%), compared with patiens with AF 2 (12.50%) and 1 (6.67%) (p_{1-2}>0.05). Regarding the probable case of depression, it was more often observed in patients with AF 2 (12.50%) and 2 (13.33%) than without it.

According to several indicators, including dizziness, fainting, increased palpitations, shortness of breath, headache, back pain, joint pain, and chest pain during the last four weeks, they assessed the state of health of men on the scale of the health questionnaire of the PHQ-15. A slight disorder was found in half of individuals (p_1<0.05) (p_2<0.05). Cases of moderate somatization disorders are constants in patients with AF (p_1>0.05) (p_2>0.05). It was found that severe somatization disorder was absent in all groups (p_{1-2}>0.05). In parallel with this, the absence of somatization disorders was not observed in women either. In patients with AF, a slight disorder of somatization was found in 3 (18.75%) and 1 (6.67%) (p_{1-2}>0.05) than in patients without AF. In the group of patients with paroxysmal AF there was a moderate disorder of somatization in 6 (40.0%) persons compared with 1 (6.25%) patient with the constant form of AF (p_2<0.05). The cases of severe somatization 1 (6.25%) and 1 (6.67%) (p_{1-2}>0.05) were found in the subjects of the groups1 and 2.

Regarding the criteria for evaluating the health of PHQ-9, isolated cases of minimal depression were detected in all groups of patients (p_{1-2}>0.05), in the half of the patients there was depression of mild type – in 6 (40.0%), 7 (43.75%), 5 (33.33%) patients of the groups 1, 2 and 3, respectively (p_{1-2}>0.05) in one third of the subjects had signs of moderate depression – in 3 (20.0%), 3 (18.75%) patients of groups 1 and 2, respectively (p_{1-2}>0.05). In persons with paroxysmal AF there was a depression of the expressive degree 1 (6.67%), however severe depression was not revealed. Analysis of the severity of depression in women, shows that there were single signs of minimal depression in 1 (6.67%) patient (p_{1-2}>0.05). The mild degree was found in 2 (13.33%) patient without AF and in third of patients with AF in 3 (18.75%) patients of group 1 and in 3 (20.0%) patients of group 2 (p_{1-2}>0.05). Moderate depression rates were found in 2 (13.33%) persons in the group 3 and in 1 (6.25%) and 2 (13.33%) persons in the groups1 and 2. The marked degree of depression occurred in persons with paroxysmal AF 2 (13.33%), and severe in persons with a constant form of AF 1 (6.25%) (p_{1-2}>0.05). The study on the level of quality of life

in the population revealed a lack of extremely low standard of living, but a low level was observed in patients without AF 1 (6.67%) in relation to patients with AF ($p_1 > 0.05$). Parameters of indicators with an average standard of living are in three groups of patients – in 8 (53.33%), 7 (43.75%) and in 8 (53.33%) patients of the groups 1, 2 and 3, respectively; high level – in 6 (40.0%), 9 (56.25%) and 5 (33.33%), respectively ($p_{1-2} > 0.05$). Interestingly, patients with paroxysmal form of AF 2 (13.33%) had a high quality of life, despite the presence of the disease ($p_{1-2} > 0.05$).

The parameters of ECG in patients with SIHD in combination with and without AF confirm left ventricular hypertrophy (VH), violation of processes of intraventricular and intraperitoneal conduction, pathological cardiac arrhythmias. It was determined, that in the group of patients without AF, the voltage was met much more often – in 11 (73.33%) persons, and low voltage in 4 (26.67%) persons, than in groups of patients with constant AF – accordingly 3 (18.75 %) ($p_1 < 0.01$) and 13 (81.25%) ($p_1 < 0.01$). In the examined patients of the group 3, there was no disorder in the rhythm of the heart. Patients in the groups 1 and 2 there were registered signs of atrial fibrillation.

To evaluate the state of the LV according to the data of the electrocardiogram, the index Marcuse was used. The study showed that in three groups, it did not exceed the normal value, while the difference between the groups was found. In patients without AF, it was (0.46±0.05 mm) ($p_1 < 0.001$), and in the group of patients with a constant AF this figure was (0±0 mm). In subjects with paroxysmal AF, the parameters of this index were (0.18±0.07 mm), which is significantly lower in comparison with patients without AF ($p_1 < 0.01$). Comparative characteristics of patients with AF, found that in subjects with paroxysmal form the index was higher than that of individuals with a constant ($p_2 < 0.05$). When calculating the PQ interval in persons of the group 1, there is a constant AF (0±0 s), and this indicator is significantly lower in comparison with those without AF ($p_1 < 0.001$). In persons of the group 2 it was (0.05±0.02 s) in comparison with the group 3 ($p_1 < 0.001$). The reliability of the indi-

cators among the groups of patients with AF was probable ($p_2 < 0.05$).

The conduction of echocardiography in patients of the examined groups showed the following. The end-diastolic size (CID) was significantly higher in patients with AF than without it ($p_1 < 0.05$). Compared with patients in the groups 1 and 2, this size was higher (5.61±0.16 cm) (5.01±0.13 cm) respectively, than in patients without AF (5.43±0.13) ($p_2 < 0.01$). The end-systolic size (DAC) in patients without AF was (3.99±0.15 cm), which was significantly ($p_1 < 0.05$) less than that of the DAC in patients with permanent forms of AF (4.26±0.16 cm) accordingly. Given the data established, the reliability of the difference in indicators compared to patients with a constant form of AF ($p_2 < 0.01$). The indicator of end-diastolic volume (KDO) was (145.07±7.72 ml) in the persons of the group 3, which was higher than in the group 2 ($p_1 < 0.05$). In addition, the volumetric indices of KDO and CSR in persons with a permanent form of AF are likely to confirm the probable difference in the indicators ($p_2 < 0.05$). The integral indicator of contractile function of the myocardium is the ejection fraction (EF, %), which was much worse in patients with CICS associated with AF ($p_2 < 0.05$). As to the mass of the myocardium LV (MMLF), they were in the group 1 (274.99±15.60 g), 2 (210.29±9.16 g) ($p_2 < 0.01$), which underlines the probable difference between these results. There are no differences between the compared groups according to the index of MMLF (IMMLF). In particular, the size of the left ventricle in patients with permanent AF was (4.44±0.08 cm), and in patients with paroxysmal (3.84±0.15 cm), ($p_2 < 0.01$). In both clinical groups, LV hypertrophy was confirmed, which was reflected in the increase in the thickness of the left wall of the left ventricle in diastole (TSCSFd) (1.19±0.02) and (1.10±0.03 cm), ($p_2 < 0.05$), respectively. In parallel with this, the size of the right ventricle was higher than normal, which also indicated an overload of the right heart departments, therefore, in patients with AF, this index significantly differed ($p_2 < 0.05$). There were no significant differences in the levels of total protein, triglycerides, β-lipoproteins in the study groups ($p_{1-2} > 0.05$).

However, it should be noted, that in patients of all groups there was an increase in the level of total cholesterol, without a significant difference between them ($p_{1-2} > 0.05$). A comparative analysis of urea indices shows increased rates in patients with AF ($p_1 < 0.01$) against the background of a significantly deteriorated course of the disease. The level of creatinine in clinical groups was within the normal range, without the probable difference between them. The ability of the liver to conjugate and release bilirubin in the serum corresponded to the referential normal range ($p_{1-2} > 0.05$). A similar trend was observed in the analysis of the activity of traxtamines – AlAT and AsAT ($p_{1-2} > 0.05$). Indicators of electrolyte balance were reduced in patients with AF without a significant difference between the study groups ($p_{1-2} > 0.05$). In the course of the study, in all groups, there were changes in the indicators of homeostasis, which went beyond the referential values. In particular, the prothrombin index (PTI) in patients of both clinical groups with AF at the time of hospitalization approached the upper boundary of the range, while in the group of patients without AF, this indicator was (110.0 ± 2.06 %) ($p_{1-2} < 0.001$). Indicator of prothrombin time (PT) was (12.21 ± 0.29) minutes in patients with SIHD without AF and (17.29 ± 1.80) and (14.55 ± 0.77) minutes with AF. These results showed that this indicator is the highest in the group of patients with a constant AF ($p_1 < 0.01$) than without it. A comparative analysis of individuals with AF showed a significant difference in rates ($p_2 < 0.001$). Accordingly, the international normalization relation (EIA) was in the comparison groups (0.94 ± 0.04) and (1.44 ± 0.16) and (1.11 ± 0.06) ($p_1 < 0.001$) ($p_2 < 0.001$). Regarding the content of fibrinogen, in the referential range of 2-4 g/l, its value was for patients without AF (2.60 ± 0.37 g/l) ($p_1 < 0.05$) and (1.13 ± 0.43 g/l) and (1.63 ± 0.36 g/l) with AF ($p_{1-2} > 0.05$). The value of hematocrit revealed a significant difference in the clinical groups of patients with AF ($p_2 < 0.001$). There is a clear tendency of these indicators to hypocoagulation. This is confirmed by the data of PTI, EIA, fibrinogen, and hematocrit in the comparison groups. Indicators of activity of catalase were increased in all groups of patients (13.09 ± 1.44 mg H_2O_2/1 ml of blood) (15.21 ± 1.29 mg H_2O_2/1 ml of blood) and (14.42 ± 1.46 mg H_2O_2/1 ml of blood) in comparison with the norm ($p_{1-2} > 0.05$). The content of superoxide dismutase in the sera of the studied groups was (29.47 ± 2.92%), (15.21 ± 1.29%), (14.42 ± 1.42%) ($p_{1-2} > 0.05$). Accordingly, glutathione peroxidase has increased in group 3 (0.17 ± 0.02 mlmol, min/mg), in the groups 1 and 2 it has decreased (0.15 ± 0.02 mlmol, min/mg) (0.14 ± 0.03 mlmol, min/mg) ($p_{1-2} > 0.05$).

Thus, in the study of the characteristics of the response to stress in patients with atrial fibrillation, psychoemotional spheres were identified. Clinical and diagnostic and prognostic value of a complex study of questionnaire and scale scores, electrocardiogram parameters and echocardiography have been proved.

3. Conclusions

1. The course of AF and the occurrence of its paroxysm in patients with SIHD is characterized by changes in the psychoemotional background, which include emotional lability, psychological distress and fear syndrome.

2. Anxiety-depressive disorders in patients with SIHD with AF are often combined with more significant changes in cardiac hemodynamics, increased levels of dyslipidemia, and disturbance in blood coagulation.

4. Prospects of Further Researches

The prospect of further research is the study of the effect of the psycho-emotional background in patients with stable ischemic heart disease with a constant form of atrial fibrillation.

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