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www.bsmi.uz
https://newdaymedicine.com E: ndmuz@mail.ru
Тел: +99890 8061882

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THE INFLUENCE OF THE SEVERITY OF CORONARY ATHEROSCLEROSIS ON THE COURSE ATRIAL FIBRILLATION

Rizaeva M.J. https://orcid.org/0009-0008-6649-4708

Bukhara State Medical Institute named after Abu Ali ibn Sina, Uzbekistan, Bukhara, st. A. Navoi. 1
Tel: +998 (65) 223-00-50 e-mail: info@bsmi.uz
Republican Scientific Center for Emergency Medicine, Bukhara branch. Uzbekistan

✓ ***Resume***

Atrial fibrillation (AF) is one of the most common versions of supraventricular tachyarrhythmia. It is believed that AF is an independent risk factor for cardiovascular disease, because cardiac arrhythmia leads to a deterioration in the quality of life of patients, the possibility of thromboembolic complications, leading to sudden cardiac death. Coronary atherosclerosis is often the cause of arrhythmias, which in turn leads to myocardial hypoxia and remodeling of the heart chambers, leading to impaired conduction of impulses and the occurrence of ectopic foci of excitation. This article will display significant pathogenetic aspects of the occurrence of cardiac arrhythmias against the background of atherosclerosis of the coronary vessels.

Key words: Atherosclerosis of the heart vessels, persistent form of atrial fibrillation, progression factors.

ВЛИЯНИЕ ВЫРАЖЕННОСТИ КОРОНАРНОГО АТЕРОСКЛЕРОЗА НА ТЕЧЕНИЕ ФИБРИЛЛЯЦИИ ПРЕДСЕРДИЙ

Ризаева М.Ж. https://orcid.org/0009-0008-6649-4708

Бухарский государственный медицинский институт имени Абу Али ибн Сины, Узбекистан, г. Бухара, ул. А. Навои. 1 Тел: +998 (65) 223-00-50 e-mail: info@bsmi.uz
Республиканский научный центр экстренной медицинской помощи, Бухарский филиал.

✓ ***Резюме***

Фибрилляция предсердий (ФП) – одна из наиболее распространенных версий наджелудочковой тахиаритмии. Считается, что ФП является независимым фактором риска сердечнососудистых заболеваний, т.к. нарушение ритма сердца приводит к ухудшению качество жизни пациентов, возможности тромбоэмболических осложнений, приводящая к внезапной сердечной смерти. Коронарный атеросклероз нередко является причиной аритмий, что в свою очередь, приводит к гипоксии миокарда и ремоделированию камер сердца, ведущая нарушению, проведения импульсов и возникновению эктопических очагов возбуждения. В данной статье будут отображены значимые патогенетические аспекты возникновения нарушения ритма сердца на фоне атеросклероза коронарных сосудов.

Ключевые слова: Атеросклероз сосудов сердца, персистирующая форма фибрилляции предсердий, факторы прогрессирования.

KORONAR ATEROSKLEROZNING OG'IRLIGI KURSGA TA'SIRI ATRIYAL FIBRILATSIYA

Rizaeva M.J. https://orcid.org/0009-0008-6649-4708

Abu Ali ibn Sino nomidagi Buxoro davlat tibbiyot instituti, O‘zbekiston, Buxoro sh. A. Navoiy kochasi 1 Tel: +998 (65) 223-00-50 e-mail: info@bsmi.uz
Respublika shoshilinch tibbiy yordam ilmiy markazi, Buxoro filiali. O'zbekiston

✓ ***Rezyume***

Atriyal fibrilatsiya (AF) supraventrikulyar taxiaritmiyaning eng keng tarqalgan versiyalaridan biridir. AF yurak-qon tomir kasalliklari uchun mustaqil xavf omili hisoblanadi, chunki. yurak aritmi bemorlarning hayot sifatining yomonlashishiga olib keladi, tromboembolik asoratlar ehtimoli to'satdan yurak o'limiga olib keladi. Koronar ateroskleroz ko'pincha aritmiyalarning sababi bo'lib, bu o'z navbatida miyokard gipoksiyasiga va yurak kameralarining qayta tuzilishiga olib keladi, bu esa impulslarning o'tkazuvchanligining buzilishiga va ektopik qo'zg'alish o'choqlarining paydo bo'lishiga olib keladi. Ushbu maqolada koronar tomirlarning aterosklerozi fonida yurak aritmiyalarining paydo bo'lishining muhim patogenetik jihatlari ko'rsatiladi.

Kalit so'zlar: yurak tomirlarining aterosklerozi, atriyal fibrilatsiyaning doimiy shakli, progressiv omillar.

Relevance

Atrial fibrillation (AF) is one of the most common versions of supraventricular tachyarrhythmia. It is believed that AF is an independent risk factor for cardiovascular disease, because cardiac arrhythmia leads to a deterioration in the quality of life of patients, the possibility of thromboembolic complications, leading to sudden cardiac death. Coronary atherosclerosis is often the cause of arrhythmias, which in turn leads to myocardial hypoxia and remodeling of the heart chambers, leading to impaired conduction of impulses and the occurrence of ectopic foci of excitation. This article will display significant pathogenetic aspects of the occurrence of cardiac arrhythmias against the background of atherosclerosis of the coronary vessels.

Key words: Atherosclerosis of the heart vessels, persistent form of atrial fibrillation, progression factors.

Factors leading to the progression of AF can be divided into "established" and "new". The "established" factors are more confirmed: arterial hypertension (AH), chronic heart failure (CHF), heart valve disease and age. And "new" and less studied factors of AF progression include coronary heart disease (IHD), obesity, diabetes mellitus, sleep apnea, chronic obstructive pulmonary disease and hereditary predisposition [3, 4]. More than 20% of patients with AF suffer from coronary heart disease [4]. AF in patients with coronary heart disease increases the risk of thromboembolic complications, which contribute to the progression of IHF. At the same time, a controversial question arises: does uncomplicated coronary heart disease predispose to the development of AF and does the severity of coronary atherosclerosis affect the course of arrhythmia [4]? AF is considered to be an independent risk factor for cardiovascular disease [8]. According to the latest data in the medical literature, there are practically no clinical studies aimed at studying the factors of arrhythmia progression in patients with coronary heart disease. In this regard, the study of the clinical course of AF in patients with coronary heart disease is relevant. The majority of patients with AF progress to a persistent or permanent form, leading to a deterioration in the clinical picture of patients and their prognosis [9].

Objective of the study: The influence of the severity of coronary atherosclerosis on the course of atrial fibrillation.

Material and methods

Was examined 112 patients with coronary heart disease and persistent AF aged 51 to 73 years (mean age 67.44 ± 3.3 years). The presence of AF and the diagnosis of coronary heart disease were confirmed based on characteristic complaints, anamnesis, physical examinations, and instrumental ones, such as ECG and echocardiography. The exclusion criteria were cardiogenic shock; acute coronary syndrome; congenital and acquired heart defects; inflammatory heart diseases; grade III obesity and thyroid dysfunction. All patients underwent diagnostic ultrasound for atherosclerotic lesions of arterial vessels. They included stenoses of the arteries of the central coronary artery - hemodynamically significant and insignificant, branches of the aorta, arteries of the lower extremities and renal arteries. The structural and functional state of the heart was studied using echocardiography on the Mindray DC 40 device (China) with a sensor with a frequency of 2.4 MHz, by calculating the average value of three consecutive cycles of the heart's work. Using standard positions of the apical and parasternal approaches. The study was carried out on the local contractility of the left and right ventricles by 18-segment division of the right and left ventricles. Using echocardiography, a regional violation of myocardial contractility (asynergy) was detected. In turn, asynergy is divided into

akinesia, hypokinesia, hyperkinesia and dyskinesia. Monitoring of patients was carried out from 2018 to 2019 (the average duration of observation was 24 ± 3 months) and included telephone calls with patients every 3 months, annual clinical examination and laboratory and instrumental studies such as daily Holter ECG monitoring, ECG and echocardiography registration. Clinical features of AF were determined based on the calculation of the number of arrhythmia attacks over 3 months, as well as the results of daily Holter ECG monitoring. Improvement of arrhythmia was considered an increase in the frequency of arrhythmia paroxysms over the past 3 months, the occurrence of long-term persistent attacks or a permanent form of AF. Over 2 years of observation, 64 (57.2%) patients (Group 1) did not show an increase in the frequency and duration of AF attacks, arrhythmia progression was noted in 48 (42.8%) patients (Group 2) out of 112 (100%) patients included in the study. The average value of arrhythmia progression was 6.7% per year. All patients included in the study had an arrhythmic history from 1 year to 8 years. With AF progression, the average duration of arrhythmia was 5.82 ± 2.35 years, and in patients without signs of progression - 4.3 ± 1.71 years ($p < 0.05$). In the history of patients with AF progression, myocardial infarction and CHF were noted more often than in patients without arrhythmia progression. Acute cerebrovascular accident (ACVA) in the history of patients of the 1st group was noted in 3 (6%), and in patients of the 2nd group - 7 (20.9%) ($p < 0.05$). According to echocardiography, the left ventricular (LV) ejection fraction (EF) was higher than 44% in all patients. In group 1, the average LV EF was 61.23 ± 6.24%, while in group 2 it was 48.47 ± 8.4%. The LV end-systolic volume (EDV) was greater in patients with AF progression than in patients without AF progression. Mitral regurgitation was diagnosed in 47% of patients in group 2 and 28% of patients in group 1 ($p < 0.05$). Patients with progressive AF had a greater number of hypokinesis and akinesis zones than patients without arrhythmia progression. (табл. 1).

Table 1. Clinical characteristics of patients

		1 group	2 group
Number of patients (%)	112(100)	64(57,2)	48(42,8)
Middle age, (M ± m)	66,4±3,3	65,5±4,23	67,52±5,19
Men, n (%)	40 (35,7)	20 (31,3)	20 (41,7)
Women, n (%)	72 (64,3)	44 (68,8)	28 (58,3)
Arterial hypertension, n (%):			
I degree	2 (1,9)	1 (1,7)	1 (2,1)
II degree	36 (33,6)	20 (33,3)	16 (34,0)
III degree	62 (57,9)	37 (61,7)	25 (53,2)
Duration of FP, years (M ± m)	5,96 ± 1,52	4,6 ± 1,74	7,84 ± 2,85 нд
Ischemic heart disease, n (%):			
Angina pectoris FC II	32 (28,2)	18 (27,4)	14 (29,2)
Angina pectoris FC ФК III	29 (23,6)	15 (22,6)	14 (25)
History of myocardial infarction, n (%)	25 (22)	10 (15,6)	15 (31,3)
History of stroke, n (%)	10 (16,2)	3 (6)	7(20,9)
Body mass index, kg/m2 (M ± m)	26,12 ± 1,98	26,82 ± 2,4	25,27 ± 3,01 нд
CHD (NYHA), n (%):	65 (58)	33 (51,5)	32 (67)

Indicator. Patients included in the study Group 1 Group 2

Note. FC — functional class; nd — unreliable.

Table 2. Echocardiography parameters at the time of inclusion of patients in the study

Echocardiography parameters	1group	2 group
FE LF,% (M ± т)	61,23 ± 6,24	48,47 ± 8,4 нд
EDV, ml (M ± т)	118,32 ± 16,3	133,42 ± 21,6нд
ESV, ml (M ± т)	43,51 ± 10,32	61,38 ± 17,19нд
PWT LV (M ± т)	1,10 ± 0,099	1,10 ± 0,06нд
IVST (M ± т)	1,2 ± 0,099	1,17 ± 0,07нд
Size LA, sm (M ± т)	4,3 ± 0,5	4,8 ± 0,1нд
Decreased local contractility of the LV myocardium, n (%):		
number of akinetic zones	17 (37)	24 (50)
number of hypokinesis zones	53 (84,1)	38 (79,2)
Mitral regurgitation, (%)	7 (28)	8 (47)

Note: EDV — end-diastolic volume; ESV — end-systolic volume; PWT — posterior wall thickness; IVST — interventricular septum thickness; LA — left atrium; nd — not reliable.

The presence of hypokinesis zones and hypokinesis segments were detected both in patients with postinfarction cardiosclerosis and in patients without a history of myocardial infarction. In patients without AF progression, the number of akinesis zones was significantly smaller than in patients with arrhythmia progression. Akinesis zones were detected in all patients with a history of myocardial infarction. In order to determine the reserve capacity of the myocardium, an acute drug test with nitroglycerin was performed in all patients. In the 1st group of patients, after taking nitrate, positive dynamics of local LV contractility was observed in the form of a decrease in the number of hypokinesis zones, a reliable increase in the number of normokinetic segments, and the zone of akinetic segments clearly did not change. In the 2nd group of patients, when taking nitrate, no reliable changes in the local contractile function of the LV myocardium were found: the number of normokinesis zones slightly increased, the number of hypokinesis zones slightly decreased, and the number of akinetic segments remained unchanged. In the 2nd group, the absence of significant changes in local myocardial contractility during an acute drug test with nitroglycerin indicates severe sclerotic changes in the LV myocardium in patients with coronary artery disease, contributing to the transition of the paroxysmal form of AF into a long-term persistent or permanent one. Taking into account many factors, the analysis revealed that independent factors in the progression of AF during the study were the presence of atrial arrhythmia, LV EF, LV hypertrophy, LA and LV dilation, severe mitral regurgitation, age of patients, and body mass index [7]. During the study period, we found significant changes in local contractility of the LV myocardium in patients with AF progression, in the form of a reliable increase in the number of akinesis zones and a decrease in the number of normokinesis zones compared to the values in patients who did not show any evolution of the arrhythmia course. At the time of the nitroglycerin test, patients in group 1 showed an improvement in local contractility of the LV myocardium, a reliable increase in the zones of normokinetic segments and a decrease in the number of hypokinesis zones. The presence of reversibility of hypokinesis areas during an acute test with nitroglycerin indicates the presence of myocardial hibernation zones in patients with coronary heart disease. When taking nitroglycerin, the absence of changes in local contractility in patients of the 2nd group indicates severe sclerotic changes in the LV myocardium, which determines remodeling of the heart chambers and progression of arrhythmia.

Conclusions

1. During the study, 42.8% of patients with ischemic heart disease with paroxysmal atrial fibrillation showed progression of arrhythmia to a persistent or permanent form. The average progression of atrial fibrillation was 6.7% per year.

2. In patients with ischemic heart disease, predictors of atrial fibrillation progression include a history of myocardial infarction, chronic heart failure, severity of mitral regurgitation, and irreversible changes in local contractility of the left ventricular myocardium.

3. Atherosclerosis of the main vessels plays a role in the comorbidity of atrial fibrillation, its powerful traumatic factor in damage to the intima of the vessels.

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