THROMBIN ACTIVITY AND EARLY OUTCOME IN UNSTABLE ANGINA PECTORIS

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Background. The blood coagulation system is frequently activated in the acute phase of unstable angina, but it is unknown whether the augmented function of the hemostatic mechanism may serve as a marker of increased risk for an early unfavorable outcome.

Methods and Results Plasma concentrations and 24-hour urinary excretion of fibrinopeptide A were prospectively determined in 150 patients with unstable angina. All patients underwent 24-hour Holter monitoring, during which time urine was collected; at the end of this period, a blood sample was taken and coronary arteriography was performed. The patients were followed up for the occurrence of cardiac events (death and myocardial infarction) until they underwent coronary revascularization or until they were discharged from the hospital. Fibrinopeptide A plasma levels and 24-hour urinary excretion were found to be abnormally elevated in 50% and 45% of the study population, respectively. During hospitalization, 11 patients developed myocardial infarction and 2 patients died. Kaplan-Meier analysis demonstrated a significantly higher probability of developing cardiac events in patients with abnormal rather than normal plasma levels of fibrinopeptide A (P<. 01), whereas no difference in outcome was observed between patients with normal and those with abnormal 24-hour urinary excretion. Cox regression analysis showed that the only variables independently related to an early unfavorable outcome were the presence of persistent ischemia during 24-hour Holter monitoring (P<.0001), the presence of intracoronary thrombosis at angiography (P=.016), and abnormal fibrinopeptide A plasma levels (P=.038).

CONCLUSIONS

Patients with unstable angina pectoris and abnormal fibrinopeptide A plasma levels are at increased risk for an early unfavorable outcome.

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PROGNOSIS IN PATIENTS WITH ACUTE CORONARY SYNDROME WITHOUT ST SEGMENT RAISE AGAINST THE BACKGROUND OF ACUTE ATRIAL FIBRILLATION

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Purpose: *To investigate the clinical and functional characteristics of patients with acute coronary syndrome without ST-segment elevation (ACS-NSTE) in the setting of acute atrial fibrillation (AF), and to evaluate the impact of AF on short-term prognosis in this patient population.*

Materials and Methods. *A total of 71 patients diagnosed with acute coronary syndrome with ST-segment elevation (ACSwSTE) were included in the study. The median age was 62 years [interquartile range: 57–70], comprising 38 women and 33 men. All patients were admitted to the intensive cardiology unit.The patients were divided into two groups:**Group 1**: ACSwSTE with acute atrial fibrillation (AF),**Group 2**: ACSwSTE without atrial fibrillation All patients underwent a comprehensive clinical evaluation, which included standard echocardiographic assessment. Hospital mortality during the observation period was analyzed as a primary outcome.*

Results. *In the group of patients with acute coronary syndrome without ST-segment elevation (ACSwSTE) and atrial fibrillation (AF), males predominated. The clinical course of ACSwSTE in the context of AF was associated with a moderate reduction in glomerular filtration rate. Electrocardiographic findings indicated that patients with AF more frequently exhibited left ventricular hypertrophy and left atrial dilatation. No deaths were recorded during the observation period.*

Conclusions:*In patients with atrial fibrillation (AF) and acute coronary syndrome with ST-segment elevation (ACSwSTE), enlargement of the left atrium, increased left atrial volume, and elevated left ventricular myocardial mass index were observed. Contrary to common belief, the presence of AF does not appear to increase in-hospital mortality in patients with ACSwSTE.*

Key words. *Atrial fibrillation, ischemic heart disease, acute coronary syndrome without ST segment elevation.*

INTRODUCTION

Atrial fibrillation (AF) is the most common arrhythmia, and its incidence is steadily increasing as the number of elderly people in the population increases[7]. The ATRIA (An Ticoagulation and Risk factors In Atrial fibrillation) study predicts that the number of patients with AF will increase by 2.5 times by 2050 [10]. According to the literature, AF is registered in 5–21 % of individuals with acute coronary syndrome (ACS) [16]. The presence of AF in patients hospitalized for ACS is associated with an increase in mortality in the

chronic form of arrhythmia by 28 %, in the acute form – by 37 % [11]. AF is also a risk factor for thromboembolic complications that require the use of vitamin K antagonists (warfarin) or new oral anticoagulants (apixaban, dabigatran, rivaroxaban), which complicates the treatment of ACS [4]. Currently, there are recommendations for the management of patients with ACS and AF, which are based primarily on expert opinion, as no relevant studies have been conducted. Therefore, it is particularly important to study the clinical characteristics, treatment, and prognosis of patients with ACS and AF.

Atrial fibrillation (AF) is the most common cardiac arrhythmia, and its prevalence continues to rise in parallel with the aging global population [7]. The ATRIA (AnTicoagulation and Risk Factors in Atrial Fibrillation) study estimates that the number of individuals affected by AF will increase 2.5-fold by the year 2050 [10]. According to existing literature, AF is present in approximately 5% to 21% of patients with acute coronary syndrome (ACS) [16]. The coexistence of AF in patients hospitalized with ACS is associated with a significant increase in mortality—28% in those with chronic AF and 37% in those with newly diagnosed (acute) AF [11]. Furthermore, AF is a well-established risk factor for thromboembolic complications, necessitating the use of oral anticoagulant therapy, including vitamin K antagonists (e.g., warfarin) or direct oral anticoagulants such as apixaban, dabigatran, and rivaroxaban. This adds complexity to the management of ACS in these patients [4]. Although clinical guidelines exist for the management of patients with concurrent ACS and AF, they are primarily based on expert consensus due to the lack of robust clinical trial data. Consequently, further investigation into the clinical characteristics, treatment strategies, and outcomes of this high-risk patient population is of critical importance.

The aim of this study is to investigate the clinical and epidemiological characteristics of patients with non-ST-segment elevation acute coronary syndrome (NSTE-ACS) and concomitant acute atrial fibrillation (AF), and to evaluate the impact of AF on short-term prognosis in this patient population.

MATERIALS AND METHODS RESEARCH

This study was conducted over a three-month period in 2025 at the Department of Emergency Cardiology № 15, City Hospital. A total of 71 patients (median age: 62 years [IQR: 57–70]) diagnosed with non-ST-segment elevation acute coronary syndrome (NSTE-ACS) were included. The cohort comprised 38 women and 33 men, all of whom were admitted to the hospital with NSTE-ACS. Patients were stratified into two groups based on the presence or absence of acute atrial fibrillation (AF) at the time of hospital admission: **Group 1**: 39 patients with NSTE-ACS and acute AF (14 women, 25 men).**Group 2**: 32 patients with NSTE-ACS without AF (24 women, 8 men)

Exclusion criteria: permanent AF, 2nd and 3rd degree AV block, additional conduction pathways, hemodynamically significant congenital or acquired heart defects, thyroid dysfunction, cancer, autoimmune or systemic inflammatory diseases, and severe liver or kidney failure.

We conducted a comprehensive analysis of clinical and laboratory parameters, including detailed medical history, anthropometric measurements (height, weight, and body mass index), and biochemical assessments (plasma lipid profiles, microalbuminuria, and glomerular filtration rate [GFR] calculated using the CKD-EPI equation). All laboratory procedures were rigorously standardized and performed with consistent equipment and reagents to ensure reliability. Additionally, all patients underwent transthoracic echocardiography (EchoCG) between the third and fifth day of hospitalization. Echocardiographic evaluations were performed using a Philips Affiniti 70 system (USA) via standard approaches to assess myocardial structural, geometric, and functional characteristics.

The following parameters were subjected to final analysis: end-diastolic anteroposterior diameter of the left atrium (CDR LP), end-diastolic diameter of the left ventricle (CDR LV), thickness of the posterior wall of the left ventricle (LVH), and interventricular septal thickness during diastole (MP); end-systolic (CSR LV) and end-diastolic volumes of the left ventricle (LVEF); left atrial volume index (IOLP); and left ventricular ejection fraction (LVEF) calculated by the Simpson method. Left ventricular myocardial mass (LVMM) was estimated using the Devereux formula [9]. The LVMM index (LVMI) was derived by normalizing LVMM to body surface area. Left ventricular hypertrophy was defined by an LVMI ≥115 g/m² in men and ≥95 g/m² in women, consistent with established criteria [3]. All patients presenting with acute atrial fibrillation underwent electrical cardioversion using the Nihon Kohden TEC-5531K defibrillator (Japan). Cardioversion was deemed successful if sinus rhythm was sustained for at least 24 hours post-procedure. After the cardioversion,, patients were prescribed beta-blockers as part of antiarrhythmic therapy.

The diagnosis and treatment of ACS were carried out in accordance with the 2024 clinical guidelines of the European Society of Cardiology.

Statistical data processing was carried out using the Statistica 6.0 application software package. Before the analysis, the compliance of the studied values with the normal distribution law was checked using the Shapiro–Wilk test. The sample had a statistically significant difference from the normal distribution, so nonparametric statistics were used. The data are presented in the form of medians and quartiles (25th and 75th percentiles). The difference between quantitative variables was evaluated using the Mann-Whitney test. The difference between qualitative variables was evaluated using the odds ratio. The level of statistical significance for the differences was set at $p < 0.05$.

RESULTS AND DISCUSSION

The clinical and laboratory characteristics of the patients are presented in Table 1. The study groups were comparable in terms of age ($p = 0.2$). The analysis of gender distribution showed that men predominated among patients with acute coronary syndrome without ST segment elevation and AF ($p = 0.002$). Our findings and those of other studies [12, 13] suggest that male gender is an independent predictor of AF development in both ACS and

the general population. The prevalence of overweight (body mass index (BMI) > 25 kg/m2) was slightly higher in the 1st group than in the 2nd group, although the differences did not reach statistical significance (p = 0.7). According to the literature, an important predictor of AF in patients is increased body weight, which is associated with a more than 2-fold increase in the risk of developing arrhythmia [15]. Some studies have shown that an increase in body mass index has a negative predictive value for the risk of developing AF in patients with stable coronary artery disease and hypertension [19], but its significance in predicting the risk of this arrhythmia in patients with ACS has not been extensively studied. It has been shown that weight loss leads to a reduction in the burden of AF and positive cardiac remodeling [5].

Chronic kidney disease was more common in patients with acute coronary syndrome without ST-segment elevation and AF (49 and 38%, respectively, p = 0.02). The eGFR was significantly lower in the 1st group, at 67 [58.2; 77.5] ml/min/1.73 m2, compared to 76 [63; 91] ml/min/1.73 m2 (p < 0.01). Currently, there is an increase in the frequency of AF among patients with chronic kidney disease. The well-known Atherosclerosis Risk in Community (ARIC) study showed that patients with GFR in different intervals (60–89; 30–59 and 15–29 ml/min/1.73 m2) have a risk ratio of developing AF (within a 10-year follow-up period) of 1.3; 1.6 and 3.2, respectively, compared to individuals with normal GFR [6]. The combination of AF and chronic kidney disease leads to an even higher incidence of ischemic stroke, thromboembolism, and mortality [20].

Dyslipidemia and arterial hypertension are the most significant classical risk factors for the development of atherosclerosis, which is an integral part of the morphological substrate of ACS [1]. When studying the lipid spectrum indicators in both groups, unsatisfactory compensation of lipid metabolism was revealed (p > 0.05). The prevalence of arterial hypertension in the studied groups was also high (100% in the first group and 89.7% in the second group, p = 0.4).

Table 2 presents the features of structural-geometric and functional indicators of the myocardium in the patients we examined. As can be seen from Table 2, left ventricular myocardial hypertrophy was more common in men with AF (88 and 37.5%, respectively, p = 0.01). Dilatation of the left atrium was observed in 65% of patients with AF (p = 0.0001). The high frequency of left atrial dilation in patients with AF was expected. A number of authors point to the relationship between the size of the left atrium and the number of episodes and duration of AF, which is due to its volume overload [2, 14]. With an increase in the size of the left atrium by 5 mm, the risk of developing AF increases by 39% [8].

Most studies have shown that AF in patients with ACS may be associated with an increased hospital mortality rate [17, 18]. However, our analysis showed that there were no deaths in either group during the hospital stay.

Table 1

Comparative analysis of clinical and laboratory parameters in patients with acute coronary syndrome without ST segment elevation and AF or in the absence of arrhythmias

Indicator	1 st group (n = 39)	2 nd group (n = 39)	Confidence level p
Age years, Me (Q1; Q3)	62 [56; 67]	63,5 [58; 71]	0,2
Gender, absolute value (%): – men – women	25 (64) 14 (36)	8 (25) 24 (75)	0,002 0,002
BMI > 25 kg/m 2, abs. (%)	25 (86)	27 (84)	0,7
History of angina pectoris ≥2 FC, abs. (%)	19 (49)	15 (47)	0,1
• Heart failure ≥2 FC, abs.v (%)	14 (36)	14 (44)	0,6
Arterial hypertension, abs.v(%)	35 (89,7)	32 (100)	0,4
Dyslipidemia, abs.v (%)	37 (94,9)	30 (93,8)	0,7
Peripheral artery disease, abs. (%)	2(6,3)	3 (7,7)	0,8
Cerebral circulation disorders, abs. (%)	1 (2,6)	1 (3,1)	0,5
Diabetes mellitus, abs. (%)	4 (10,3)	5 (15,6)	0,7
Chronic kidney disease, abs. V.(%)	19 (49)	12 (38)	0,02
Smoking, abs. V (%)	12 (30,8)	2 (6,3)	0,02
GFR by CKD-EPI, ml/min, Me (Q1; Q3)	67 [58,2; 77,5]	76 [63; 91]	0,01
Microalbuminuria, abs.v(%)	11 (28,2)	6 (18,8)	0,5
Total cholesterol, mmol/L, Me (Q1; Q3)	5,5 [4,8; 6,5]	5,1 [4,3; 6,0]	0,2
Low-density lipoproteins, mmol/L, Me (Q1; Q3)	3,4 [2,7; 4,4]	3 [2,5; 3,9]	0,1
High-density	1,3 [1,0;	1,4 [1,1; 1,5]	0,08

lipoproteins, mmol/L, Me (Q1; Q3)	1,4]		
Triglycerides, mmol/L, Me (Q1; Q3)	1,28 [0,9; 1,6]	1,28 [1,0; 1,9]	0,3

Table 2

Comparative analysis of structural, geometric, and functional indicators of the myocardium in patients with acute coronary syndrome without ST segment elevation and AF, or in the absence of arrhythmia

Indicator	1-st group (n = 32)	2-nd group (n = 39)	P
LA, mm, Me (Q1; Q3)	41 [37; 43]	37 [33,5; 39,0]	0,002
LA > 40 mm, abs. (%)	21 (65)	8 (20)	0,0001
VLA, ml, Me (Q1; Q3)	59 [51; 70]	43 [40; 51]	0,0001
IVLA, ml/m2, Me (Q1; Q3)	31,5 [28,7; 37,0]	24 [20,0; 27,5]	0,0001
Total EF, %	57 (51; 67)	58 (53; 69)	0,7
IMMLV,g/m2 men, Me (Q1; Q3)	129,2 [123,7; 133,5]	97,1 [88,6; 115,3]	0,02
IMMLV,g/m2 women, Me (Q1; Q3)	103,4 [86,5; 124,0]	106,4 [79,5; 117,0]	0,6
IMMLV,g/m2, ≥115 men,abs. (%)	22 (88)	3 (37,5)	0,01
IMMLV,g/m2 ,≥95 women, abs. (%)	8 (57,1)	15 (62,5)	0,9

CONCLUSIONS

1. The prevalence of AF is higher in males, both in acute coronary syndrome without ST-segment elevation and in the general population.

2. In this study, the course of acute coronary syndrome without ST segment elevation with AF was characterized by a more pronounced decrease in GFR, which may be associated with a worse cardiovascular prognosis.

3. In patients with AF and acute coronary syndrome without ST segment elevation, an increase in the left atrium, left atrial volume, and left ventricular myocardial mass index was detected.

4. The presence of an episode of acute AF did not increase hospital mortality in acute coronary syndrome without ST segment elevation.

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