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Clinical Characteristics of Patients with Coronary Heart Disease with Various Cardiac Conduction Disorders

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Abstract: Coronary heart disease (CHD) occupies a leading position among the causes of morbidity and mortality worldwide. One of the serious complications of CHD is cardiac conduction disorders, which can lead to a significant worsening of prognosis, increased risk of sudden cardiac death, chronic heart failure, and disability of patients.

Keywords: heart blocks, atrioventricular block, bundle of His, sick sinus syndrome, chronic heart failure.

Introduction. Coronary heart disease (CHD) occupies a leading position among the causes of morbidity and mortality worldwide. One of the serious complications of CHD is cardiac conduction disorders, which can lead to a significant worsening of prognosis, increased risk of sudden cardiac death, chronic heart failure, and disability of patients. Patients with CHD often experience atrioventricular (AV) blocks, bundle branch blocks, sinoatrial blocks, and intraventricular conduction delays.

Sudden development of conduction disorders, especially against the background of acute myocardial infarction (AMI), can significantly worsen the prognosis. Ischemia and hypoxia contribute to structural and functional changes in the cardiac conduction system (sclerosis, inflammation, fibrosis, ion channel dysfunction). Acute and chronic ischemia alters the electrophysiological properties of the myocardium, causing slowing or blocking of impulse conduction. Conduction disorders can be asymptomatic or lead to fainting, dizziness, heart failure, and decreased tolerance to physical activity. High-degree AV blocks increase the risk of sudden cardiac death, requiring timely diagnosis and correction. The use of electrocardiography (ECG), Holter monitoring, electrophysiological study (EPS), stress tests, and cardiac magnetic resonance imaging allows the detection of hidden forms of conduction disorders. The development of non-invasive diagnostic methods makes it possible to more accurately predict the risk of developing severe arrhythmias and their consequences. Conduction disorders may require medical treatment (beta-blockers, antiarrhythmics, ACE inhibitors) or surgical treatment (pacemaker implantation, resynchronization therapy). The importance of timely risk assessment and selection of the optimal treatment method determines the relevance of further study of this problem.

Despite numerous studies, the problem of conduction disorders in CHD remains relevant:

The pathophysiological mechanisms of the development of conduction disorders in CHD have been studied, but questions remain about the predictors of their occurrence and progression. Risk factors have been identified, but personalized approaches to predicting conduction disorders require further clarification. Modern diagnostic methods have been developed, however, the need for their widespread introduction into clinical practice remains debatable. Treatment tactics continue to improve, including the selection of optimal medication therapy regimens and indications for pacemaker implantation.

Research Objective. To study the clinical characteristics of patients with coronary heart disease with various cardiac conduction disorders.

Materials and Methods. All patients underwent a comprehensive examination which included the following studies: General clinical examination: survey (complaints, anamnestic data), physical examination; Instrumental research (ECG, echocardiography, Holter monitoring, coronary angiography);

Biochemical blood tests (determination of creatinine, urea, residual nitrogen, HDL, LDL, total cholesterol, triglycerides, etc.).

Results. At the Samarkand Branch of the Republican Scientific and Practical Center of Cardiology (SF RSPCC) in the rhythm disorders department, 124 patients with coronary heart disease (CHD) and various cardiac conduction disorders were selected. Additionally, 40 patients with CHD without cardiac rhythm disorders were included as a comparable group. This study was conducted over three years (2024-2026). The average age of patients was 58.7±11.74. There were 68 men (54.8%) and 56 women (45.2%). Based on clinical and biochemical blood tests which determined the lipid profile (cholesterol, LDL, HDL levels), kidney and liver function, as well as ECG, echocardiography, 24-hour Holter cardiac rhythm monitoring, and treadmill tests, individuals were selected for the control group. The groups were comparable in terms of age and gender.

Table 1. Clinical Characteristics of Study Patients with Cardiac Rhythm Disorders

Characteristic	Patients with coronary heart disease+HP, n= 124	Patients with coronary heart disease without HP, n=40	P-value
Age, years	58,7±11,74	57,9±11,58	0,78
M/W, n	68 (54,8%)/56(45,2%)	22(55,0%)/18(65,0%)	0,62
Hypertension, n (%)	92 (74,1%)	28 (70,0%)	0,063
Metabolic syndrome	32(25,8%)	9(22,5%)	0,08
Diabetes mellitus, n (%)	26 (20,9%)	8 (20,0%)	0,92
history of MI, n (%)	24 (19,35%)	9 (22,5%)	0,079
LVEF, %	55,2±11,04	57,4±11,48	0,057
heart rate, beats/min	78,3±15,66	82,4±16,48	0,001
CHF 0 FC 0, n (%)	32 (25,8%)	6 (15,0%)	0,001
CHF I FC I, n (%)	28 (22,5%)	5 (12,5%)	0,001
CHF II A FC II, n (%)	24 (19,35%)	4 (10,0%)	0,001
CHF II B FC III, n (%)	18 (14,5%)	3 (7,5%)	0,001

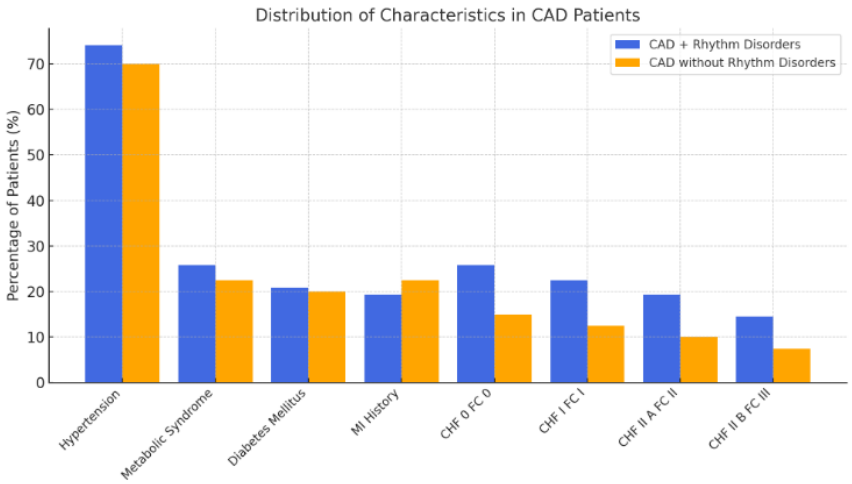

Figure 1. Clinical characteristics of the examined patients with cardiac arrhythmias

The mean age of patients with CHD + conduction disorders (CD) is 58.7 years (with a deviation of 11.74 years), while in patients with CHD without CD, it is 57.9 years (with a deviation of 11.58 years). In the group with CHD and CD, there are 68 (54.8%) men and 56 (45.2%) women. In the group with CHD without CD, there are 22 men (55%) and 18 women (45%). In the CHD + CD group, 92 patients (74.1%) have hypertension, while in the CHD without CD group, 28 patients (70%) have hypertension. In the CHD + CD group, 26 patients (20.9%) suffer from diabetes mellitus, while in the CHD without CD group, 8 patients (20%) have diabetes.

In the CHD + CD group, 24 patients (19.35%) had a history of myocardial infarction, while in the CHD without CD group, 9 patients (22.5%) had such history. The mean value of LVEF in the CHD + CD group is 55.2% (with a deviation of 11.04%), while in the group without CD, it is 57.4% (with a deviation of 11.48%). Heart rate (HR), beats per minute: The average HR in the CHD + CD group is 78.3 bpm (with a deviation of 15.66), while in the CHD without CD group, it is 82.4 bpm (with a deviation of 16.48).

1. Chronic heart failure (CHF) and functional classes (FC):

- CHF 0 FC 0: In the CHD + CD group, 32 patients (25.8%) have CHF stage 0 (FC 0), while in the CHD without CD group, 6 patients (15%) have this stage.
- CHF I FC I: In the CHD + CD group, 28 patients (22.5%) have CHF stage 1 (FC I), while in the CHD without CD group, 5 patients (12.5%) have this stage.
- CHF II A FC II: In the CHD + CD group, 24 patients (19.35%) have CHF stage 2A (FC II), while in the CHD without CD group, 4 patients (10%) have this stage.
- CHF II B FC III: In the CHD + CD group, 18 patients (14.5%) have CHF stage 2B (FC III), while in the CHD without CD group, 3 patients (7.5%) have this stage.

Thus, Table 2.1 allows comparison of two groups of patients with CHD with CD and without CD, where it can be seen that among patients with CHD and CD, conditions such as hypertension and metabolic syndrome are more common, and in the main group of patients, signs of CHF were significantly more frequent ($p \geq 0.01$).

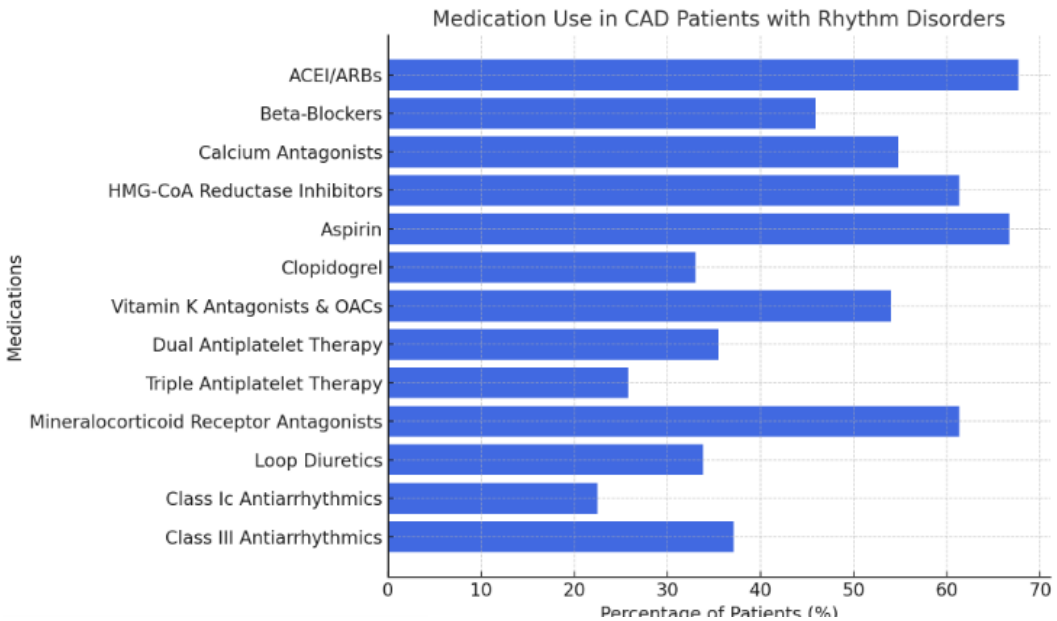

Figure 2. Medications prescribed to patients with coronary heart disease+HP

Figure 2 shows information on the use of various drugs in patients with coronary artery disease (CHD) and rhythm disturbances (HR) in a group of 124 people. Ace inhibitors/ARA, n (%) — angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor antagonists; 67.7% of patients took these

drugs, 45.9% of patients received beta-blockers, 54.8% of patients used calcium antagonists, 61.3% of patients took drugs that inhibit HMG-CoA reductase (statins), 66.7% of patients took acetylsalicylic acid (aspirin), 33% of patients used clopidogrel, 54% of patients used drugs that which act as anticoagulants, 35.5% of patients used dual therapy consisting of two antiplatelet agents, 25.8% of patients used triple antiplatelet therapy., 61.3% of patients took mineralcorticoid receptor antagonists, 33.8% of patients used loop diuretics, 22.5% of patients took class Ic antiarrhythmics, 37.1% of patients used class III antiarrhythmics.

Table 3. Frequency of occurrence of cardiac arrhythmias in patients with coronary heart disease, n=124

Characteristic	Quantity (n)	Percentage (%)
Grade I SUB, n(%)	14	11,3%
Grade II SUB, n(%)	10	8,1%
Grade III SUB, n(%)	6	4,8%
Atrioventricular block (AV block) n (%)	26	21,0%
Grade I n (%)	14	11,3%
Grade II (Mobitz 1, Mobitz 2) n (%)	8	6,5%
Grade III (full AV blockblockage) n (%)	4	3,2%
Blockage of the legs of the Gis bundle n (%)	52	41,9%
Left-pedicel blockage (complete/incomplete) n (%)	12/14	9,7% / 11,3%
Right-pedicel blockage (complete/incomplete) n (%)	14/12	11,3% / 9,7%
Sinus node weakness syndrome n (%)	16	12,9%

This table presents the prevalence characteristics of various cardiovascular diseases and conditions in a group of patients (total 124 people). It includes the number of patients and the percentage ratio of each condition relative to the total number.

Sinoatrial block (SAB) grade I was detected in 14 patients (11.3% of the total number), SAB grade II in 10 patients (8.1% of the total number), SAB grade III in 6 patients (4.8% of the total number).

Atrioventricular blocks were identified in 26 patients (21.0%):

- ✓ Grade I: 14 patients (11.3%)
- ✓ Grade II (Mobitz 1 and Mobitz 2): 8 patients (6.5%)
- ✓ Grade III (complete AV block): 4 patients (3.2%)

Bundle branch blocks were found in 52 patients (41.9%):

- ✓ Left bundle branch block (complete/incomplete): 12 patients with complete block (9.7%) and 14 patients with incomplete block (11.3%)
- ✓ Right bundle branch block (complete/incomplete): 14 patients with complete block (11.3%) and 12 patients with incomplete block (9.7%)
- ✓ In total, 41.9% of patients have bundle branch block

Sick sinus syndrome was observed in 16 patients (12.9%).

Thus, bundle branch blocks (41.9%) and atrioventricular blocks (21.0%) were most prevalent.

Discussion of Research Results. The results of the conducted study confirm the significance of cardiac conduction disorders in patients with coronary heart disease (CHD) and their impact on the clinical course of the disease. The data indicate a high prevalence of various types of cardiac conduction system blocks among patients with CHD, which emphasizes the need for early detection and timely correction of these conditions.

The mean age of patients with CHD and rhythm disorders (CHD+CD) was 58.7 years, which is comparable to the age of the control group (CHD without CD – 57.9 years). Gender distribution also did not reveal significant differences between the groups; however, a higher presence of risk factors was noted in patients with CHD+CD. For instance, hypertension was diagnosed in 74.1% of patients with CHD+CD versus 70.0% in the control group. The presence of metabolic syndrome, diabetes mellitus, and history of myocardial infarction was also somewhat higher in patients with rhythm disorders, indicating their possible role in the development of conduction disorders.

One of the key parameters of the study was the assessment of left ventricular ejection fraction (LVEF). In patients with CHD+CD, this indicator was 55.2%, which is slightly lower compared to patients without rhythm disorders (57.4%); however, the difference did not reach statistical significance. At the same time, significantly lower heart rate (HR) in the CHD+CD group (78.3 bpm versus 82.4 bpm in the control group) may indicate a more pronounced dysfunction of the cardiac conduction system.

Analysis of the functional class of chronic heart failure (CHF) showed that patients with CHD+CD have a higher frequency of severe forms of the disease. In particular, CHF IIA (FC II) and CHF IIB (FC III) were diagnosed significantly more often in the group with rhythm disorders. This confirms the hypothesis of a relationship between conduction disorders and the progression of heart failure.

The most common conduction disorder in patients with CHD was bundle branch block, which was detected in 41.9% of patients. This is consistent with literature data, according to which damage to the cardiac conduction system due to ischemia and myocardial fibrosis is a frequent complication of CHD. Atrioventricular blocks were found in 21.0% of patients, with first-degree AV block being the most common (11.3%). Sick sinus syndrome was diagnosed in 12.9% of patients, which also confirms the significance of automaticity disorders in this category of patients.

Data on drug therapy show that patients with CHD+CD more often took angiotensin-converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARBs) (67.7%), as well as beta-adrenoblockers (45.9%). This is explained by the need to control blood pressure and heart rate in this group of patients. The use of anticoagulants, dual and triple antiplatelet therapy was also widespread, which is associated with a high risk of thromboembolic complications in patients with rhythm disorders.

Conclusions. The obtained data confirm the significant prevalence of conduction disorders among patients with CHD and their impact on the clinical course of the disease. The presence of cardiac conduction system blocks is associated with greater severity of heart failure, decreased LVEF, and a higher risk of adverse outcomes. These results emphasize the importance of timely diagnosis and treatment of these conditions, as well as the need for further research to clarify the pathophysiological mechanisms of their development and improve personalized approaches to prediction and therapy.

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