

Case Report

Diagnosis of Ventricular Asystole with Complete Transient Atrioventricular Block

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Abbreviations

VA AV: Ventricular Asystole; AVB: Atrioventricular Block; AF: Atrial Flutter; SVT: Supraventricular Tachycardia; CHD: Coronary Heart Disease; RFA: Radiofrequency Ablation; CHF: Chronic Heart Failure; COPD: Chronic Obstructive Pulmonary Disease; ISHNE: The International Society For Holter And Non-Invasive Electrocardiology; HRS: Heart Rhythm Society; INR: International Normalized Ratio; EHRA II: European Heart Rhythm Association II; RHD: Rheumatic Heart Disease; ECG: Electrocardiogram

Introduction

Atrial Flutter (AF) is one of the most common types of cardiac arrhythmias in clinical practice. About 10% of Supraventricular Tachycardia (SVT) is accompanied by atrial flutter. In 81% of cases, the cause of AF is Coronary Heart Disease (CHD), and the remaining 19% of cases are due to open-heart surgery, postmyocardial cardiosclerosis, and prior Radiofrequency Ablation (RFA) and an idiopathic variant throughout AF [1]. Older age, CHD, valvular and non-valvular heart disease, and Chronic Heart Failure (CHF) are the main risk factors for AF [2]. The comorbidities of Chronic Obstructive Pulmonary Disease (COPD) and pulmonary hypertension increase the morbidity by 3.5 and 1.9 times, respectively [2]. In AF, the AV node is capable of conducting no more than 200–250 impulses per minute. Therefore, a protective AVB develops, and only every 2–4 atrial impulses are conducted into the ventricles. The development of asystole, AV block III, and pneumonia in older age groups with concomitant cardio-respiratory pathology increases in-hospital mortality of AF patients by 4 times [3].

Holter monitoring is recommended for diagnosing diseases of the cardiovascular system by the International Society for Holter and Non-Invasive Electrocardiology (ISHNE) and the Heart Rhythm Society (HRS) [4]. Holter reveals a wide range of significant rhythm and conduction disturbances in a clinically asymptomatic patient with a permanent form of atrial flutter.

In this clinical case, a patient with atrial flutter had long R-R

Abstract

Holter monitoring is a diagnostic method for patients with suspected arrhythmias. This clinical case describes persistent form of atrial flutter and Ventricular Asystole (VA) with Atrioventricular Block (AVB) diagnosed by Holter monitor. Diagnostics found VA of more than 3.0 seconds, meaning this condition may not always be associated with syncope.

Keywords: Ventricular asystole; Holter monitoring; Atrioventricular block; Coronary heart disease

pauses up to 34.88 seconds during the daytime. The patient did not have clinical symptoms, however, ventricular asystole with AVB was diagnosed after Holter monitoring. Timely diagnosis of cardiac conduction disturbances made it possible to provide timely medical care and implant a pacemaker.

Case Presentation

Patient M, 57 years old woman, was diagnosed with complex disturbances in the formation of an impulse and heart rhythms, such as sick sinus syndrome, and tachy-brady syndrome in 2020. From the anamnesis, it is known that rheumatic heart disease was detected at the age of 5 years.

Cardiac rhythm disturbance was first recorded in 2017. For treatment, according to the scheme Kordaron tablets (200 mg for 3 months), Digoxin (0.25 mg, 1 tablet in the morning under the control of heart rate), and Warfarin (2.5 mg, 1.25 tab at 17.00 under the control of the International Normalized Ratio (INR)) were prescribed. However, the rhythm was not restored. Due to the ineffectiveness of drug treatment, in the same year, pulmonary vein isolation using a balloon-mounted cryoablation system was performed. Nevertheless, there was no positive effect, and the tachysystolic variant of European Heart Rhythm Association II (EHRA II) continued.

Further progression of rheumatic heart disease (RHD) manifested itself as a complication of valvular heart disease. Combined heart defects such as aortic and tricuspid insufficiency of the 3rd degree, combined mitral valve disease with a predominance of 4th degree insufficiency with a decrease in the systolic function of the left ventricle (ejection fraction 43%) were diagnosed. According to NYHA, the abovementioned corresponds to heart failure (functional class III). In 2018, the patient had a surgical correction of valvular pathology of the heart, mitral valve replacement with SJM Masters №29, aortic valve replacement with SJM Masters №23, and suturing of the left atrial appendage under cardiopulmonary bypass. The patient received constant basic therapy: Warfarin (2.5 mg/day under the control of INR), Bisoprolol (5 mg/day), and Digoxin (0.25 mg/day).

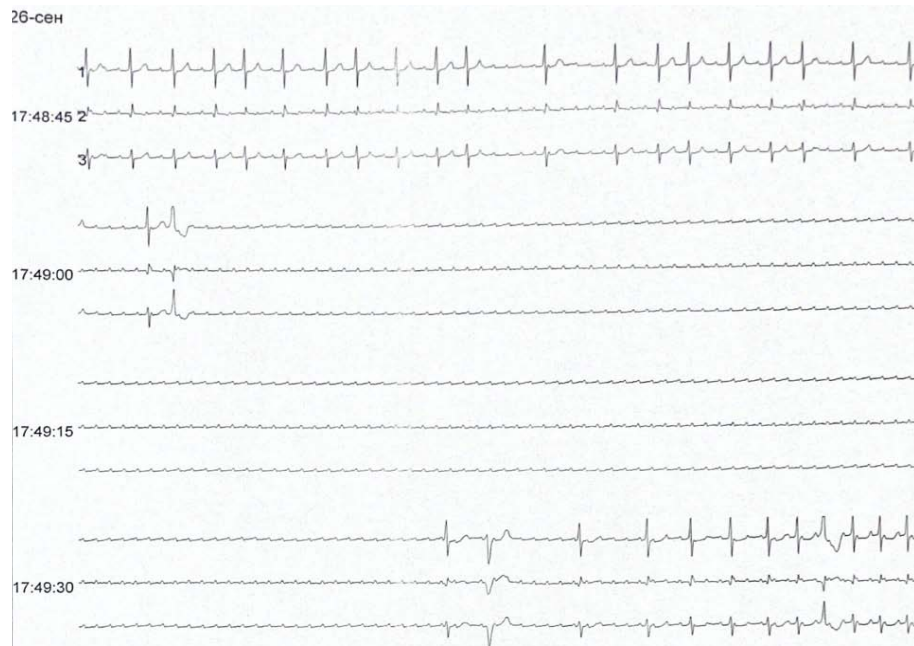


Figure 1: Atrial flutter. Ventricular asystole, R-R pause is 34.88 seconds. Transient complete atrioventricular block.

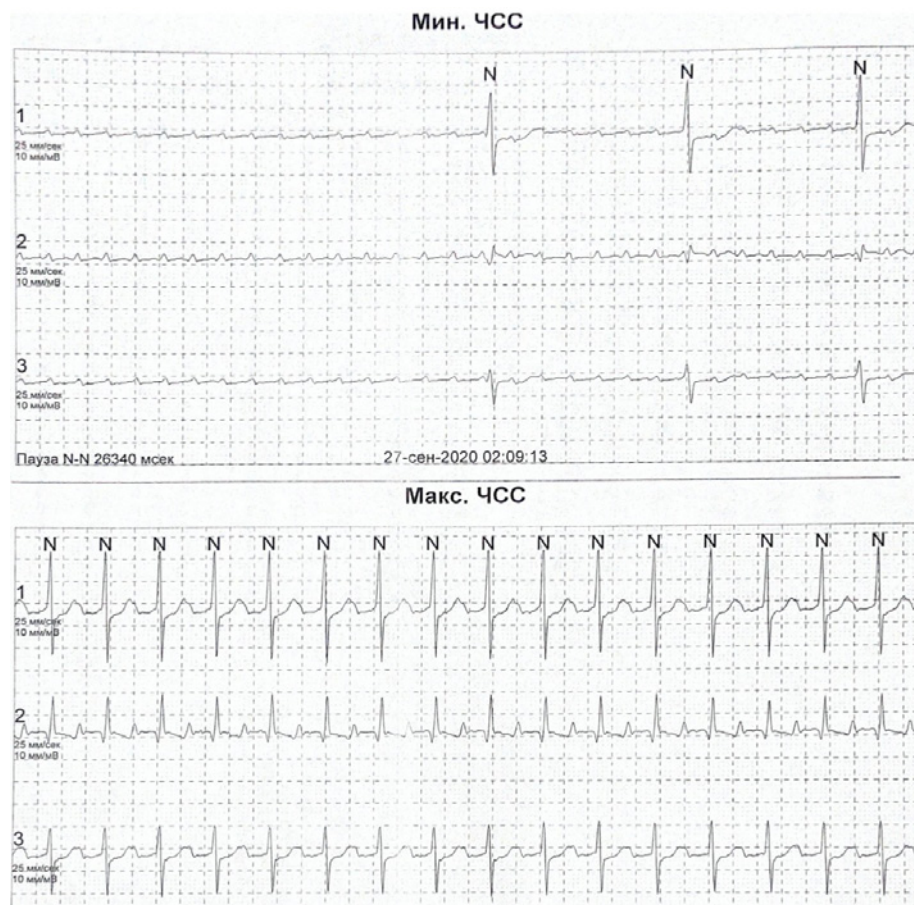


Figure 2: Maximum and minimum heart rate.



Figure 3: Atrial flutter, atrial rate 250 bpm.

Table 1: Results of Holter monitoring.

Basic heart rhythm parameters	Interpretation of Holter monitoring
Heart rhythm	Basic rhythm atrial flutter
Average heart rate	97 bpm
Minimum heart rate	8 bpm, after R-R pause 26.340 sec (02:09)
Maximum heart rate	131 bpm (08:52)
R-R pauses over 3.0 sec	In total 8. The maximum pause is 34.88 sec (17:49) ventricular asystole 437:1, in the daytime. Complete AV block (Figure 1). The atrial rate averages 250 beats per minute (Figure 3).
Contractions in tachycardia (greater than 100 bpm)	48%
Contractions in bradycardia (less than 60 bpm)	2%

In 2020, she underwent Holter monitoring on an outpatient basis. The analysis revealed 8 long R-R pauses of more than 3 seconds (Figure 1), with a maximum heart rate of 131 beats/min and a minimum heart rate of 8 beats/min (Figure 2). A permanent form of atrial flutter with an average atrial rate of 250 beats per minute was registered (Figure 3). Based on the results of Holter, ventricular asystole was detected in the amount of 8 episodes per day, and complete transient AVB (Table 1).

Considering the results of Holter monitoring, hospitalization was recommended for pacemaker implantation. According to the recommendation of the European Society of Cardiology, implantation of pacing is recommended for the patient [5]. The informed consent was obtained, and there were no contraindications for the operation. A permanent pacemaker Biotronic Enticos 4 DR MRI SN 69653900 in DDI-55 bpm mode was implanted.

Discussion

This article presents a unique case of a complete AVB complicated by the development of episodes of ventricular asystole, which were not accompanied by syncope. This condition could be fatal for the patient

if it is not timely detected. In this clinical case, Holter monitoring showed its high diagnostic informativeness, because timely diagnosis made it possible to identify and assess the severity of arrhythmias. Complete AV blockade causes significant circulatory disorders such as a decrease in cardiac output and blood pressure, and impaired blood circulation in organs and tissues.

Violation of hemodynamics can be complicated by the Stokes-Adams syndrome leading to the cessation of effective heart work. Perhaps this fact motivates the need for routine Holter monitoring in this category of individuals for early detection of asymptomatic arrhythmias and their timely correction. One of the studies describes 4 cases with episodes of critical bradycardia due to drug intoxication, 3 cases of digitalis intoxication, and 1 case of severe poisoning with Verapamil tablets (suicide). In the latter case, an Electrocardiogram (ECG) recorded the ventricular asystole lasting 24 seconds with the development of syncope [6]. In our clinical case, the patient's medical history, RHD, surgical treatment of valvular pathology correction, cryoballoon isolation of the pulmonary vein orifices, and constant basic therapy (Digoxin and Concor tablets) led to a high risk of ventricular asystole, which was revealed on Holter monitoring.

The Holter monitoring is effective in the presence of some severe asymptomatic arrhythmias, including prolonged asystole (≥ 3 s), and frequent supraventricular tachycardia (≥ 160 per minute for >32 beats), or ventricular tachycardia [7,8]. Each Holter result can be unique, and we can identify various new types of arrhythmia and cardiac conduction disorders that have never been recorded before. The same happened in the case described here. Nowadays Holter monitoring is widely used in both outpatient and inpatient settings and has the ease of conducting research for patients. All this can allow clinicians to increase the number of outpatients observed, reduce the time of diagnosis, and improve the efficiency and effectiveness of patient treatment.

Authors' Contributions

BA: conceptualization, visualization, original draft writing; ST: methodology, visualization; MT: validation; ZG: review and editing of the draft; KZ: review and editing of the final manuscript; submission. KG: supervision, review of the final manuscript.

Statement of Ethics

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. This case report was conducted in compliance with the principles of the Declaration of Helsinki. The Ethical Committee of National Research Oncology Center (permit number №13) approved this study.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Patient Consent Statement

The patient's written consent to publish their information has been obtained before the submission to the journal.

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