CASE REPORT

Specific Issues of Complex Functional Diagnostics of Acute Coronary Syndrome

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SUMMARY

The article discusses the possibilities of modern echocardiography in the diagnosis of acute coronary syndrome (ACS) without ST segment elevation, emphasizes the importance of a comprehensive assessment for the diagnosis. A clinical case of non-Q- myocardial infarction is demonstrated.
Keywords: acute coronary syndrome, echocardiography, ST-segment depression, non-Q-forming myocardial infarction

INTRODUCTION

At the present stage of providing medical care to patients with ACS, the importance of the electrocardiographic (ECG) research method can hardly be underestimated. In the literature ECG variants of myocardial infarction (MI) are widely covered. Despite this, the topical diagnosis of MI and the determination of an infarct-associated artery on the basis of interpretation of changes in the terminal part of the ventricular complex on ECG, which are of a nonspecific nature, cause difficulties[1-3].

According to a number of authors, ST segment depression is recorded in patients with critical stenosis of the proximal anterior interventricular branch (LAD), and in some patients with complete occlusion of the named artery, which is associated with a high risk of developing widespread MI of the anterior wall of the left ventricle[4].

V.N. Orlov describes depression of the ST segment with the arch turned convex towards displacement as a sign of subendocardial damage to the anterior wall of the left ventricle under the electrode or in transmural damage located on the wall opposite to the electrode, as a result of reciprocal changes. The ST segment displacement in case of myocardial injury differs from those in the case of ventricular hypertrophy and complete intraventricular bundle branch blocks, in which the convexity of the ST segment arc is directed in the direction opposite to its displacement[5].

ST segment depression with a high pointed T wave in the anterior chest leads within the de Winter electrocardiographic pattern is also associated with LAD occlusion. Critical stenosis or occlusion of the LAD on the ECG may not always be accompanied by an elevation of the ST segment in the leads of the anterior wall. Often, the registration of an inverted T wave or biphasic T wave with an isoelectric position of the ST segment or its minimal elevation (less than 1 mm) can be interpreted as Wellens syndrome by the name of the author who described it.

Taking into account the variety of changes in the ST segment and T wave against the background of coronary artery disease, the interpretation of ECG data with the determination of the localization and depth of myocardial damage causes difficulties. The implementation of hightech methods for diagnosing coronary heart disease (coronary angiography, magnetic resonance imaging, myocardial scintigraphy) in an urgent situation and nowdays is not possible in all medical hospitals. It is the cumulative assessment of ECG data, taking into account complaints, clinical manifestations, anamnestic findings, the level of biomarkers of myocardial necrosis and such an accessible non-invasive, easily reproducible research method as echocardiography (EchoCG) that makes it possible to increase the accuracy of the diagnostic conclusion, which is important for determining further treatment tactics for a patient with MI. Transthoracic echocardiography allows not only a differential diagnostic search in a patient with nonspecific ST-T changes accompanied by chest pain, but also clarifies the topical localization of myocardial infarction[6-10].

CASE REPORT

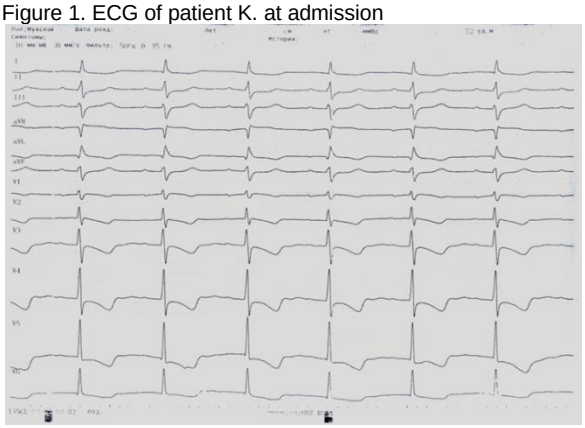
For the period from 2018 to 2020 we observed patients with ACS (12 people, 7 men and 5 women), aged from 47 to 72, on average 58.8±1.0 years, who were hospitalized in the emergency cardiology department of the Ryazan regional clinical hospital. On the first day upon admission, the patients underwent an ECG in 12 leads with registration of additional leads if necessary, a traditional EchoCG using a two-dimensional, one-dimensional, Doppler mode using color Doppler mapping, tissue Doppler.

All examined patients with ACS without ST-segment elevation showed ECG changes in the form of ST-segment depression in the chest leads (V1-V4). The QRS complex changes were nonspecific. All these patients showed an increase in the activity of cardiospecific enzymes (troponin I, T, MB-CPK) of varying severity, which was regarded as a manifestation of non-Q-MI. EchoCG in 4 patients (33.3%) revealed violations of the kinetics of the anterior, antero-septal segments; in 8 patients (66.7%), violations of the kinetics of the posterior and lower segments were recorded; of them, 3 (37.5%) had lesions of the right coronary artery during coronary angiography. It should be noted that during the subsequent ECG assessment in dynamics in patients with lesions of the anterior wall, ST segment depression persisted on average for a longer time than in patients with inferior or posterior myocardial lesions.

CASE 1

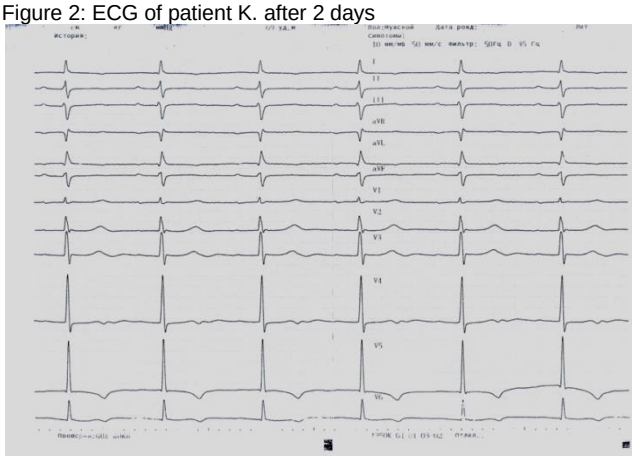
We present to your attention a clinical case of patient K., 62 years old, who was admitted to the emergency cardiology department of the Ryazan regional clinical hospital with ACS. An ECG study in the emergency room recorded depression of the ST segment from 1 mm or more in leads V2-V6 (Fig. 1).

Figure 1. ECG of patient K. at admission



EchoCG revealed zones of akinesis of the lower, posterior basal and middle segments of the left ventricle, which made it possible to interpret MI of the lower and posterior localization. Dynamic observation 2 days after stenting of the right coronary artery showed the ST approach to the isoline with the T wave reversion in the right leads (Fig. 2).

Figure 2: ECG of patient K. after 2 days

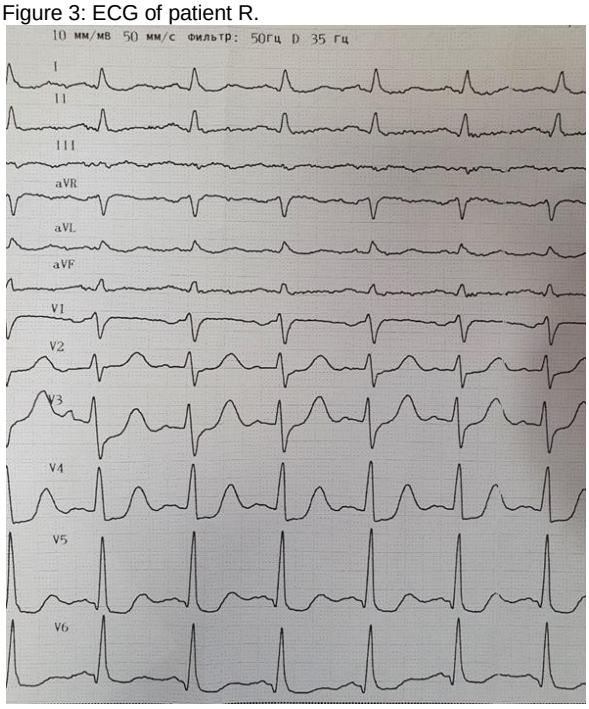


Thus, infarct-like ECG changes of a nonspecific nature require a cumulative assessment with the involvement of additional instrumental research methods (EchoCG), taking into account the patient's complaints, anamnesis data and the characteristics of the clinical picture, and only in this case can they serve as a basis for confirming the final diagnosis of MI.

CASE 2

Patient R., born in 1951, was admitted to the emergency cardiology department of the Ryazan regional clinical hospital with a diagnosis ACS without ST segment elevation. An ECG study in the department recorded moderate sinus tachycardia, depression of the ST segment in leads V3-V6. (Fig. 3). According to the ECG data, it was assumed that the LAD was affected.

Figure 3: ECG of patient R.



The results of ultrasound examination of the heart: aorta of normal size, 22-33 mm, enlargement of the cavities of the left atrium (45 * 58 mm), right atrium (39 * 48 mm), left ventricle: LV EDC 72 mm, LV EDC 50 mm. Decreased global contractility of the left ventricle, ejection fraction 41%, zones of posterior segment akinesia, hypokinesis of the lower segments, relative hyperkinesis of the interventricular septum were revealed. Mitral regurgitation grade 2, tricuspid regurgitation grade 2. Moderate pulmonary hypertension.

In laboratory investigations: complete blood count: erythrocytes $4.6*10^{12}$/liters, hemoglobin 104 g/l, leukocytes $14.8*10^{9}$/liters, platelets $462*10^{9}$/liters, ESR 47 mm/hour. Blood test for troponin I 1430 ng/ml. Biochemical blood test: total protein 75 g/L, AST 124 U/L, ALT 124 U/L, CPK 644 U/L, MB-CPK 28 U/L, creatinine 117 μmol/L (GFR 24 ml/min/1,73m^2), glucose 5.4 mmol/L, total cholesterol 4.7 mmol/L, potassium 4.5 μmol/L, sodium 135 μmol/L, fibrinogen 5.5 g/L, APTT 172 sec, INR 1.29.

Coronary angiography revealed the right type of blood supply. The trunk of the left coronary artery with irregular contours, stenosis of the LAD 70%, stenosis of the

circumflex artery 95%, stenosis of the right coronary artery in the middle segment by 99%, stenosis of the orifice of the posterior interventricular artery by 60%. Stenting of the distal segment of the right coronary artery was performed. On the basis of the patient's complaints, clinical and laboratory data, indicators of instrumental studies, the patient was diagnosed with coronary heart disease: non-Q-MI of the posterior wall of the left ventricle. Stenosing atherosclerosis of the coronary arteries.

DISCUSSION AND CONCLUSION

The use of modern ultrasound imaging methods along with the traditional ECG makes it possible to objectify and clarify the topical localization of myocardial damage in acute coronary syndrome without ST segment elevation.

Depression of the ST segment in the chest leads may be associated not only with lesions of the anterior wall, but also be a manifestation of reciprocal changes in lesions of the posterior wall in the absence of direct signs of subepicardial damage on the ECG and significant changes in the QRS complex.

Declaration of author's competing interests: The authors declare no conflict of interest.

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