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IMMEDIATE RESULTS OF DELAYED PERCUTANEOUS CORONARY INTERVENTIONS IN PATIENTS WITH ACUTE CORONARY SYNDROME

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ABSTRACT

Objective. Percutaneous coronary interventions (PCI) have long been an effective tool in the treatment of acute coronary syndromes (ACS), and timely interventions in such patients have great importance. However, due to socio-economic difficulties, it is not always possible to treat adequately this acute condition, in accordance with established international criteria. This gives an opportunity to investigate the results of the practical approach to delayed percutaneous coronary interventions in patients with acute coronary syndrome.

Purpose. Evaluate the immediate results of delayed percutaneous coronary interventions in patients with acute coronary syndrome.

Methods. In this study were included patients with ACS who received coronary angiography with stenting of coronary arteries («acute» PCI group, 42 patients), patients who were treated by medical therapy for ACS in the hospital without possibility of PCI (50 patients), and medically stabilized patients after ACS, which were given for angiography and PCI. (average, 30 days after ACS, 49 patients). The groups did not differ in basic demographic and clinical characteristics. Standard clinical, electrocardiographic (ECG) and echocardiographic (ECHO) data were evaluated.

Results. In the PCI groups, angiographic success was achieved in 100%. The average time from the symptoms onset to PCI in the «acute» group was 89.4 hours. In the «acute» group, mortality was 3 patients (7.1%), and in the medical therapy group, mortality was 18% (p <0,05). In the «acute» group two patients had cardiac adverse events, and at presented they had a cardiogenic shock symptoms, one patient died from complications due to major bleeding. The positive dynamics of ST segment recovery on the ECG and ECHO parameters was more pronounced in the «acute» PCI group.

Conclusions. Despite on the time delay, PCI in ACS is more effective method of restoring myocardial function even in comparison with patients who received early thrombolysis.

Key words: *percutaneous coronary interventions, acute coronary syndrome.*

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INTRODUCTION

In recent years, the European Society of Cardiologists (ESC), the European Association of Cardiothoracic Surgery (EACTS) and other international associations of cardiologists have issued quite a few recommendations on myocardial revascularization in acute coronary syndrome (ACS).

Timeliness is a very important factor in the effectiveness of revascularization in ACS. Numerous controlled studies have shown the relationship between the total time of ischemia, that is, between the onset of symptoms and reperfusion (thrombolysis, mechanical reperfusion, or PCI) with a prognosis for the success of revascularization [1,2]. Reperfusion by primary PCI is indicated to all patients with a symptomatology duration less than 12 hours and persistent ST elevation or an anticipated, first complete left bundle branch block [3,4,5]. According to many authors, reperfusion by the primary PCI method should be also considered for patients after 12-48 hours from the onset of symptoms [6,7,8]. The time from admission to the primary hospital until the restoration of blood flow in the infarct related artery must be within the interval less than 120 minutes, which is associated with less hospital-acquired mortality [9,10].

With ACS without ST segment elevation, the time of angiography and revascularization is not so clear. The choice of tactics is based on the patient's risk profile. Patients at very high risk should undergo early angiography (within 2 hours). Patients at high-risk with at least one primary criterion (regular increase or decrease of troponin, dynamic changes in ST and T, GRACE> 140) should receive invasive care within 24 hours, which looks like an adequate time interval. In subgroups of lower risk, with GRACE <140, but with at least one secondary criterion (diabetes mellitus, renal failure, ejection fraction <40%, early postinfarction angina, recently performed percutaneous coronary intervention (PCI), coronary artery bypass grafting history) it's possible to delay the invasive intervention without increasing the risk, but it is performed during the same hospitalization, preferably within 72 hours of admission. In low-risk groups without recurrent symptoms, a non-invasive evaluation of provoked ischemia should be performed before discharge [11].

Obviously, in patients with ACS, the timeliness of interventions is very important. However, due to socio-economic and logistical difficulties, it is not always possible to meet deadlines in accordance with established international criteria and standards. In this regard, this study analyzed the results of the practical approach to the tactics of «forced» delayed PCI in patients with ACS.

The aim of the study was to assess the immediate results of delayed PCI in patients with ACS.

MATERIAL AND METHODS

The research was carried out retrospectively. It included 141 patients, which were divided into three groups. The study group № 1 consisted of 42 patients, to whom from 2013 to 2016 PCI because of ACS were performed. The second group (control group) consisted of 50 patients who were admitted urgently with the diagnosis of ACS to the cardioresuscitation department of the clinic without the possibility of angiography and who received optimal medication, (in 40% (20 patients) of cases, thrombolytic therapy (TLT) was used). The third group consisted of 49 patients who underwent PCI on various terms after their stabilization. The results obtained in the last group were compared with the purpose of determining the need for PCI.

The diagnosis of coronary heart disease (CHD) was made to all patients upon admission on the basis of complaints, anamnesis, clinical manifestations and various additional examination methods. Electrocardiographic (ECG) data were also evaluated: the ST segment dynamics, and echocardiographic (ECHO) data in dynamics: ejection fraction (EF), end-diastolic size of the left ventricle, and end-systolic size of left ventricle. Patients of the 1st and 3rd groups underwent coronary angiography, followed by stenting of the coronary arteries. Stenting of the coronary arteries was carried out after obtaining informed consent. All patients received a loading dose of acetylsalicylic acid 500 mg, clopidogrel 600 mg in the absence of these drugs in basic daily therapy. Immediately prior to PCI, intraarterially administration of 5000 units of heparin was administered. The number of implantable stents in stable patients depended on the number of affected arteries with hemodynamically significant stenoses/ occlusions and the patient's material condition. In patients with ACS, the infarct-related artery (ISA) was mainly stented. If there is a possibility on the part of the patient, after the implantation of the stents in the ISA, stenting of the remaining hemodynamically significant stenosis of different localization was performed to increase the completeness of myocardial revascularization. Stenting of arteries, not associated with zone of the infarction / ischemia, was performed only in case of adequate clinical picture, stable hemodynamics, absence of negative ECG dynamics, presence of angiographic data on adequate filling (gradation TIMI 2, 3) of ISA after stent implantation. For the procedures, stents with coating and without coating were used, the choice of which depended on the anatomy of the lesion, the presence of concomitant diseases, the material situation of the patient. After the procedures, the patients were transferred to the intensive care unit for dynamic observation.

Patients were distributed depending on the diagnosis at admission during the acute period, which is presented in table 1.

In all three groups, the number of men significantly differed from the number of women in the same groups ($p<0.05$): 32 patients (76.2%) in the first group, 31 patients (62%) in the second group, and in the third group, the number of men was 40 patients (81.6%). However, the intergroup comparison did not reveal any differences ($p>0.05$). By age, there were no significant differences in the three groups ($p>0.05$).

In patients with ACS, the time from the onset of seizures to the types of considered treatment (OMT and PCI) varied from an hour to several days. The majority of patients in the first group – 25 people (61%) – entered the hospital after 72 hours from the onset of the attack, which led to destabilization. The median time in these patients was 89.4±17.5 hours, and in the second group, 75.3±4.1 hours ($p<0.05$). In the 2nd group, there were patients admitted to the hospital up to 12 hours – 35 people (70%), which in principle corresponds to the recommended strategies ($p<0.05$). The majority of patients of the third group – 33 people (67.3%) – had PCI performed in one month after the stabilization after drug treatment in various hospitals for ACS.

All patients had different ischemic changes on the ECG in an acute period. The dynamics of the ECG of the indicators was assessed initially and on the 3rd day after the intervention according to the

Table 1. The distribution of patients depending on the diagnosis at admission during the acute period (*- p<0,05)

Diagnosis on admission	1st group, N=42	2nd group, N=50	3rd group, N=49
Refractory unstable angina	10(23,8%)	13(26%)	27(55,1%)*
Not a Q-wave MI	14(33,3%)*	7(14%)	8(16,3%)
Q-wave MI	18(42,9%)	30(60%)*	14(28,6%)

Table 2. Indicators of deviation of the ST segment

	1st group			2nd goup		
	Initialy in mm	3-5 days, in mm	Percentage of return from source, in %	Initialy in mm	3-5 days, in mm	Percentage of return from source, in %
The value of ST segment elevation in mm	2,8±1,0	0,76±0,9	72,8%*	3,76±2,2	1,7±1,0	45,2%
The value of ST segment depression in mm	2,1±1,0	0,27±0,1	87,1%*	2.23±0,8	1,5±0,2	67,2%

following criteria: 1) ST segment elevation/ depression in mm; 2) the percentage resolution in elevation of the ST segment in the lead with its highest rise; 3) residual depression of the ST segment, regardless of the withdrawal on day 3 after the intervention.

STATISTICAL METHODS OF RESEARCH

The received data was processed on a computer using the statistical program SPSS statistics 17v. Comparison of the average indicators was made using standard methods of variation statistics of the medical and biological profile. The distribution of the variables was tested using the Kolmogorov-Smirnov test. In the case of a normal distribution of variables, we used: Student's t-test, single-factor analysis of variance (ANOVA). In the distribution of variables that are not amenable to normal distribution: the Mann-Whitney U test, the Wilcoxon sign criterion, Klaskel-Wallis criteria, Friedman. When comparing the nominal values, the χ2-Pearson criterion was used.

RESULTS

As shown in table 2, the most the most prominent indicators of the decrease in the ST segment were obtained in the group with delayed PCI.

The percentage reduction in the ST segment in the study group was 72.8% in patients with elevation and 87% in the return of the segment with ST segment depression. At the same time, in comparison with the 2nd group, a significant difference was found in this criterion ($p<0.05$), where these indicators were 45.2% and 67.2%, respectively.

It should be noted that the number of patients who received TLT in the 1st group was significantly less than in the 2nd group (4.8% and 40%, respectively, $p<0.05$). In the subgroup TLT of the 2nd group, the percentage of the return of ST segment to the isoline was 50%, which was also significantly different from patients with ACS with ST elevation if 1st group ($p<0,05$).

Among patients with ACS with an elevation of ST 27 (79.4%) were included in the low-risk category (<1 mm residual rise of the ST segment). The average value was 0.43±0.3 mm. Only 3 patients were included in the high-risk group with an average value of 3.3±0.6 mm. All patients with ACS without ST elevation from the study group had a residual deviation of ST ≤1 mm, on average it was 0.56±0.3 mm. In the 2nd group, among patients with ACS with ST elevation, the average residual ST deviation in 14 patients (35.9%) was 0.64±0.4 mm. The subgroup of average risk included 2 patients (5%), where the average value was 1.5±0.1 mm. In 23 patients (58.9%) in the high-risk subgroup, the average value was 3.4±1.3 mm. Among the patients of the 2nd group with ACS without ST elevation, in 6 patients the residual deviation was on average 0.5±0.4 mm. The subgroup with high risks included 5 patients, where the average value was 3.4±2.07 mm. In the intergroup comparison, a significant difference was determined on the criterion of residual ST-segment deviation ($p<0,05$).

Figures 1, 2, 3, 3 show the dynamics of ECHO parameters at baseline and 3-5 days after treatment in each group.

The parameters of the ejection fraction (EF) of the left ventricle (LV) in the patients of the 1st and 2nd group were not statistically different at admission to the hospital, as well as end-systolic size of left ventricle e. The initial ejection fraction (EF) of the left ventricle (LV) in the 1st group was significantly less than in the patients of the 3rd group, whereas the end-systolic size of left ventricle was significantly higher ($p<0,05$). The average values of end-diastolic size of the left ventricle at admission did not differ among groups. The average ejection fraction of left ventricular before the treatment in the study group was 49.3±12.7, the end-diastolic size of the left ventricle was 55.1±5.6, the end-systolic size of left ventricle was 40.45±7.9. Meanwhile, a decrease in the left ventricular ejection fraction below 65% was observed in the 1st group in 39 (92.8%), in the second group in 45 (90%) and in the third group in 38 (77, 5%) patients. As can be seen, in the percentage ratio, patients with initially decreased ejection fraction of left ventricular were prevalent in the 2nd group, although no statistical difference was observed between the groups.

After the treatment, the ejection fraction of left ventricular in patients of the 1st group was 54.4±11.6%, which significantly

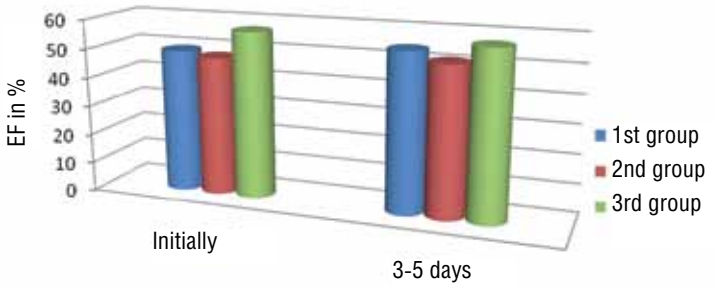

Figure 1. The parameters of the ejection fraction (EF) initially and after the procedure

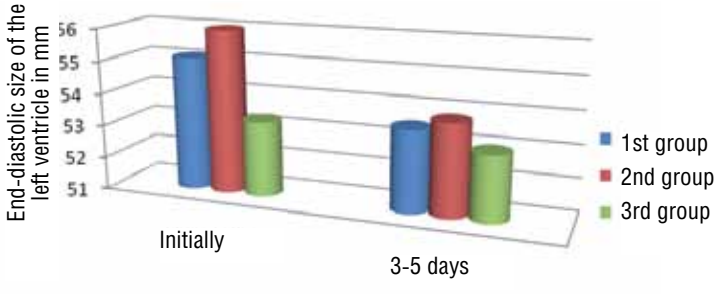

Figure 2. Indicators of end-diastolic size of the left ventricle initially and after the procedure

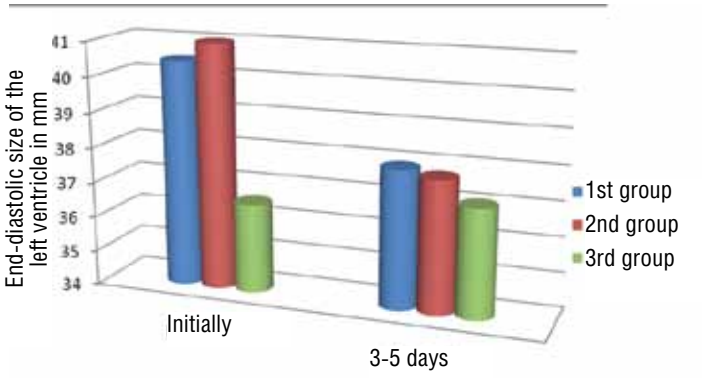

Figure 3. Indices of the end-systolic size of left ventricle initially and after the procedure

differed from the 2nd group, where this index was 51.18±10.2% ($p<0.05$). Despite the fact that the mean ejection fraction of left ventricular after stenting was the highest in the 3rd group, there was no reliable dynamics of this indicator ($p>0.05$). There was also no confidence in the dynamics in the 2nd and 3rd groups in terms of end-diastolic size of the left ventricle (53.88±4.6 and 53±5.5 mm, respectively) and the end-systolic size of left ventricle (37.75±6.0 and 37.08±5.5 mm, respectively) after the treatment. On the contrary, in the 1st group there was a pronounced dynamics of these average indicators in the direction of decrease of size of left ventricle after delayed PCI (end-diastolic size of the left ventricle – 53,55±6,7 mm, end-systolic size of left ventricle – 37,93±7,2 mm).

The mortality during hospitalization was 3 (7.1%) in the 1st group and 9 (18%) in the 2nd group ($p<0.05$). In the third group we didn't register any lethal cases.

DISCUSSION

The main result of this study is that PCI provides better immediate results, even if they are performed at a later date from the onset of symptoms of ACS. Patients with ACS with ST segment elevation in most cases had indications for an invasive strategy despite late terms, most had post infarction angina, unstable hemodynamic, or an increase in ischemia on the ECG. Previously, it was shown that a decrease in the ST segment after revascularization, (it's percentage decrease in the lead with maximum elevation), is an independent indicator, determining a prognosis. In our study, the greatest decrease in the ST segment was observed in the «primary» PCI group. Another ECG indicator of the effectiveness of reperfusion and prognosis considered residual ST elevation in any ECG lead after revascularization [12]. In our study, this indicator also decreased significantly more in the primary PCI group.

Primary PCI, despite the delayed procedure, proved to be most effective in restoring left ventricle function even in comparison with patients who received early thrombolytic therapy.

Moreover, hospital mortality was significantly lower in the group of primary PCI compared with the group of drug therapy, and mortality in the main group was consistent with the data of other authors [13].

Thus, in the conditions of Kyrgyzstan, with a shortage of modern medicines, especially medications that affect the blood coagulation system, the lack of medical equipment, primary PCI, even despite the later timing of interventions due to social, economic and logistical difficulties, provide better immediate results in comparison with drug therapy, both in terms of the nearest forecast, and in the clinical and functional state. Long-term results and analysis of prognostic factors require further survey on a larger number of studied patients.

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