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EVALUATION OF THE USE OF NITRATES IN THE TREATMENT OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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Treatment of acute left ventricular failure that develops against the background of acute myocardial infarction (MI) remains one of the most pressing problems of modern cardiology , which determines the importance of searching for new drugs aimed at reducing resistance, cardiac output, limiting the infarction zone, and improving myocardial metabolism. For this purpose, 3 peripheral vasodilators are increasingly used.

Studies by a number of authors have shown that peripheral vasodilators improve the balance between the need for oxygen and its delivery to the myocardium by reducing pre- and afterload . According to the summary data of clinical studies, these drugs reduce mortality in acute MI from 18 to 12% ($p < 0.001$).

However, there is another point of view, according to which, with a sharp decrease in blood pressure, coronary blood flow decreases, which leads to a leading to a lack of oxygen supply to the myocardium and the development of “steal syndrome”.

In connection with the above, the objective of this study was a comparative study of the effects of intravenous infusion of nitroglycerin (NTG), isodinite (IDN) and monizide (MND) in patients with acute myocardial infarction complicated by left ventricular failure .

Material and methods

We observed 68 patients with acute MI (men, average age 4 9, 2 3, 4 years), in whom the course of the disease was complicated by the development of left ventricular failure without signs of cardiogenic shock. All patients were taken to the cardiac

intensive care unit of the Republican Scientific Center for Emergency Medical Care of the Samarkand branch within the first 12 hours from the onset of a pain attack.

Using a random sampling method, patients were divided into 3 groups. Group 1 consisted of 26 patients treated with IDN (isosorbide dinitrate ,) at a dose of 6-20 mcg/min, 2-22 patients, in whose treatment MN D (isosorbide-5-mononitrate,) was used at a dose of 5-15 mcg/min. In 20 patients of group III, NTG was used to relieve signs of left ventricular failure at a rate of 50-100 mcg/min. All drugs were administered intravenously .

In connection with the study of the affected area using 35 precordial ECG leads, patients with acute myocardial infarction of anterior localization were selected for the study. During the formation of the groups, patients with left bundle branch block and severe rhythm disturbances were excluded. To monitor the state of hemodynamics, all patients underwent catheterization of the pulmonary artery through the right subclavian access with the installation of a Swan - Ganz type catheter (Elecath , USA). Heart rate , istolic (BP) and diastolic (APd) blood pressure, pulmonary artery wedge pressure (PAWP), cardiac index (CI), and total peripheral resistance (TPR) were analyzed . The determination of coronary venous blood flow (CVF) velocity was carried out under conditions of catheterization of the coronary sinus and great vein of the heart using a BaimTm thermistor catheter , No. 7E (Elecath , USA). The coronary sinus CVC level was assessed as the total venous blood flow of the left ventricle, outflow from the anterior and partially lateral walls of the left ventricle (affected area) based on the blood flow velocity in the great vein of the heart. ECG and pressure curves were recorded using an RM-6000 polygraph (Nihon - Kohden , Japan).

The studied parameters were determined at baseline (before the start of drug administration) and 5, 15, 30, 60 minutes after the start of infusion .

Results and discussion

During treatment, a significant improvement in the clinical condition was noted in 59 (86.8%) patients, and in 9 (13.2%) patients, clinical manifestations of left ventricular failure and pain persisted for more than a day, despite the normalization of blood pressure. The effect of drug administration developed quite quickly - at 5-7 minutes from the start of the infusion . All drugs had a pronounced peripheral vasodilator effect, clinically manifested in the disappearance of acrocyanosis , warming of the skin; in 9 (13.2%) patients, a feeling of heat appeared , which disappeared when the infusion rate was reduced . In patients of all 3 groups, there was a significant decrease or disappearance of signs of left ventricular failure: a decrease in shortness of breath, the amount of moist rales in the lungs, and an increase in diuresis. More rapid relief of circulatory failure was observed in patients receiving IDN. There were no side effects that would require stopping the infusion in any of the study groups.

It is characteristic that by the 5th minute from the start of drug administration in all groups there was an increase in heart rate, which was not statistically significant and by the 30th minute it returned to the initial level. At first infusion , heart rate increased to a greater extent in patients receiving NTG. When comparing the effectiveness of the drugs on heart rate, it should be noted that all of them caused an increase in this indicator in the first 15 minutes of action. This was probably due to a decrease in OPS, since a decrease in blood pressure was also detected during the same period. When using NTG, tachycardia could also be of a reflex nature, since a drop in blood pressure leads to the activation of the baroreceptor reflex and the sympathetic-adrenal system. NTG in the first 5 minutes of action reduced TPS, BP and PAWP significantly more than MND and IDN ($p < 0.05$). It seems significant that such a rapid and significant decrease in PAWP in the first 5 minutes of NTG action led to a more pronounced decrease in blood pressure and an increase in heart rate. However, by the 60th minute, an effective reduction in PAWP was achieved in the group of patients receiving IDN (by 36.4%) and MND (by 39.1%).

In patients of all 3 groups, CI increased slightly ; this was more typical for MND and IDN.

According to the results of precordial ECG mapping, positive dynamics in patients of all 3 groups was noted within 60 minutes from the start of treatment (Table 2). By the end of the 1st day of acute MI, there was a significant decrease in the total elevation of the S T segment (2S1) in patients of the 1st and 2nd

groups (by 15.3 and 11.4%, respectively; $p < 0.05$), in patients of group 3, the Sum of ST decreased by 9.4% compared to the baseline level.

Noteworthy is the significant limitation of the total area of the Q and QS waves by the end of the 1st day of treatment. With the introduction of IDN and MND, this indicator decreased by 12% ($p<0.05$), in the group of people receiving IGT - by 7.2% ($p << 0.05$). Meanwhile, a significant decrease in the mass of myocardial necrosis by the end of the 1st day was noted only with the use of IDN (by 9.5%; $p < 0.05$). In general, a significant relationship was identified between the effectiveness of IDN and NTG. Thus, the correlation coefficient between the decrease in 2Q and QS after the introduction of IDN and IGT was 0.71 ($p < < 0.01$). A similar, although weaker, connection was established between the effectiveness of MND and IGT ($r=.03$; $p < 0.05$). Thus, in terms of the severity of the effect, IDN is superior to NTG and somewhat better than MND. However, the identified correlation may indicate the presence of only quantitative differences in the effectiveness of the drugs and suggests that in the absence of the effect of IGT, it is unlikely that the effect of taking other nitrates will be obtained.

Thus, the use of peripheral vasodilators in the treatment of left ventricular failure in patients with acute MI helps to achieve fairly rapid positive dynamics in ECG parameters. The most significant changes were noted in individuals of groups 1 and 2.

The accelerated dynamics of the reverse development of Q and QS waves during the use of peripheral vasodilators can be explained by a decrease in myocardial oxygen demand in conditions of reduced resistance to cardiac output and an improvement in coronary blood supply to this zone due to an increase in blood flow through collaterals. This phenomenon can be interpreted as an indicator of a better outcome of acute MI with the formation of a smaller scar field .

The dynamics of CK levels under the influence of the studied drugs are presented in the figure. All drugs within 5-10 minutes from the start of infusion led to a decrease in total blood flow and blood supply to the affected area of the myocardium.

The most significant restriction of blood flow was caused by intravenous administration of IDN ($p < 0.01$).

Subsequently, drip administration of IDN led to the most significant increase in the total (by 18.5%; $p < 0.05$) blood flow and blood supply to the necrosis zone ($p < 0.01$).

When using MND, a significant improvement in myocardial blood supply was also achieved (by 18.5%; $p < 0.05$). The increase in blood flow in the affected area did not exceed 24% ($p < < 0.01$) of the initial level. However, the dynamics of blood supply redistribution were softer. In this group, along with a significant clinical effect, no adverse reactions were noted in any patient.

The administration of NTG (up to the 20th minute) caused a limitation of the total myocardial blood flow with an unreliable increase of 7.7% at the 60th minute.

In the affected area, the decrease in blood flow during NTG infusion continued until the 50th minute, the increase in CVC by the 60th minute was 7.4%.

Thus, under the influence of the studied peripheral vasodilators, a predominant increase in blood supply to the affected area was noted. This is likely due to a decrease in preload

Decrease in PAWP along with increase in SI. According to some authors, these effects directly contribute to the opening of coronary collaterals . A decrease in intraventricular pressure and volumes of the ventricles of the heart helps to reduce the tension of the myocardial walls and, as a result, increase the number of functioning collaterals and reduce the resistance to blood flow in them . An alternative possibility for increasing blood flow in this area may be the dilation of the post-stenotic segments of the large coronary arteries under the influence of the drug.

It was assumed, given the 100% bioavailability of isosorbide-5-mononitrate and its longer half-life, that the features The pharmacokinetics of IND also ensure its higher clinical effectiveness . However, according to our observations, this drug is superior to NTG in terms of clinical effects and inferior to IDN, having a “milder” effect and causing fewer side effects. The rapid positive dynamics of electrocardiographic signs of myocardial damage and a significant improvement in hemodynamic parameters,

coronary blood supply and clinical condition of patients when using IDN infusion , indirectly indicating a decrease in the prenecrotic zone, provide a higher effectiveness of this drug compared to other peripheral vasodilators used.

conclusions

1. Nitroglycerin, monizide and isodinite are highly effective mixed-type vasodilators for the treatment of left ventricular

failure in patients in the acute stage of myocardial infarction.

2. The mechanism of action of the drugs in these groups of patients does not differ fundamentally.

3. The clinical effectiveness of monizide is superior to that of nitroglycerin and inferior to isodinite .

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