Impact of the COVID-19 Pandemic on Myocardial Revascularization in Patients with Acute Coronary Syndrome in the Russian Federation

Alekyan B.G.[1], Boytsov S.A.[2,3], Ganyukov V.I.[4]*, Manoshkina E.M.[5]

[1] National Medical Research Center of Surgery named after A. Vishnevsky, Moscow, Russia

[2] National Medical Research Center of Cardiology named after academician E.I. Chazov, Moscow, Russia

[3] A.I. Yevdokimov Moscow State University of Medicine and Dentistry, Moscow, Russia

[4] Research Institute for Complex Issues of Cardiovascular Diseases, Kemerovo, Russia

[5] Russian Research Institute of Health, Moscow, Russia

Aim. To compare and analyze the results of myocardial revascularization in the Russian Federation (RF) with acute coronary syndrome (ACS) before the onset (2018-2019) and during the novel coronavirus infection (COVID-19) pandemic (2020-2021).

Material and methods. The analysis included the number of cases of ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation acute coronary syndrome (NSTE-ACS), the number of cases of myocardial revascularization in the above forms of ACS, the number of deaths depending on the form of ACS and the method performed revascularization. The period of time before the start of the coronavirus pandemic corresponded to the annual data received in the Russian Federation for 2018-2019. The period of the coronavirus disease pandemic corresponded to the annual data received in the country for 2020-2021. Absolute, relative, estimated values of patient hospitalization, myocardial revascularization procedures, and mortality in ACS were compared between time periods before and during the COVID-19 pandemic. The data for analysis were obtained from the monitoring of the Ministry of Health of Russia.

Results. In 2018 and 2019 in the RF, 531,019 and 501,238 patients were hospitalized with a diagnosis of ACS, and during the pandemic (2020-2021) – 403,931 and 397,930 patients, respectively. Reduction in the number of patients diagnosed with ACS admitted to hospitals in Russia by 22.32% in 2020-2021 years was mainly due to a significant decrease in hospitalizations of patients with a diagnosis of NSTE-ACS (by 29.03%). At the same time, admission to clinics of patients with STEMI decreased only by 6.02%. During the COVID-19 pandemic, mortality increased significantly in PPCI (by 9.6%) and in the general STEMI group (by 12.3%); significantly increased mortality both in the general group (by 48%) and during PCI in patients with NSTE-ACS (by 28.6%); there was an increase in the average annual number of PPCI (by 12.6%), which was accompanied by an increased average annual number of PPCI per 1 million of population (up to 451 per 1 million of population); a slight increase in the average time "symptom-balloon" (by 2 minutes) was recorded; there was an absolute slight decrease and a relative increase in the number of PCIs in NSTE-ACS (by 2.7% and 37.1%, respectively). In 2021, in the Russian Federation, primary PCI was performed in 50.2%, thrombolytic therapy – in 23.1%, and 26.7% of patients remained without reperfusion. Pharmacoinphasive strategy was applied in 60%, and isolated thrombolysis – in 40% of patients.

Conclusion. During the COVID-19 pandemic, revascularization in patients with ACS in Russia corresponded to the following trends recorded in the literature: increased hospital mortality in PPCI and in the general STEMI group; hospital mortality both in the general group and during PCI in patients with NSTE-ACS. The indicators of myocardial revascularization in ACS in the RF during the pandemic were fundamentally different from the data of Western countries: there was an increase in the average annual number of PPCI and the average annual number of PPCI per 1 million population; a slight increase in the average symptom-balloon time was recorded; revealed an absolute slight decrease and a relative increase in the number of PCIs in NSTE-ACS.

Keywords: Russian Federation, acute coronary syndrome, myocardial reperfusion, COVID-19.

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*Corresponding Author: ganyukov@mail.ru

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Introduction

In March 2020, the World Health Organization announced the beginning of a pandemic as a result of an exponential increase in morbidity and a constant increase in mortality caused by a new coronavirus infection (COrona VIrus Disease 2019; COVID-19) [1, 2]. Over the next 2 years of the unprecedented spread of COVID-19 in the world, numerous literature data appeared on the adverse impact of the COVID-19 pandemic on the organizational and clinical results of the treatment of acute coronary syndrome (ACS), including in the section of myocardial revascularization [3-11]. Domestic original studies on ACS during the COVID-19 pandemic are few, and the results obtained are ambiguous [12-15].

The aim of this study is to compare and analyze the results of myocardial revascularization in the Russian Federation (RF) with acute coronary syndrome (ACS) before the onset (2018-2019) and during the novel coronavirus infection (COVID-19) pandemic (2020-2021).

Material and methods

Two time intervals were chosen to study the impact of the COVID-19 pandemic on myocardial revascularization in patients with ACS in the Russian Federation: the average annual results of myocardial revascularization before the pandemic (2018-2019) and during the pandemic (2020-2021). The article analyzed and compared absolute, relative and calculated indicators in ACS in terms of the number of hospitalizations, the number and forms of revascularization (reperfusion), as well as mortality. Comparison was performed in two groups of patients with ACS: myocardial infarction with electrocardiogram ST-segment elevation (STEMI) and acute coronary syndrome without electrocardiogram ST-segment elevation (NSTE-ACS). Subgroups were selected for analysis in each of the groups, respectively, the methodology for the formation of which was described by us earlier [13].

Analysis of the results of myocardial revascularization in ACS was carried out on the basis of annual monitoring data of the Ministry of Health of Russia (Monitoring of measures to reduce mortality from coronary heart disease (letters of the Ministry of Health of Russia dated March 13, 2015 No. 17-6/10/1-177 and dated July 24, 2015 No. 17-9/10/2-4128), within the framework of which data collection is carried out monthly on the portal of the Federal State Budgetary Institution «Central Research Institute for Health Organization and Informatization» of the Ministry of Health of Russia - Automated System for Monitoring Medical Statistics (http://asmms.mednet.ru) for ACS.

The indicators of coronary artery bypass grafting in ACS were not analyzed in this work, because the monitoring of the Russian Ministry of Health doesn't contain such information.

Descriptive statistics methods were used with the presentation of indicators in the form of absolute values and/or percentage terms in data processing. The statistical significance of the differences between the measures was not assessed.

Results

Comparison of the number of ACS cases in the Russian Federation in 2018-2021

In 2018 and 2019, 531,019 and 501,238 patients, respectively, were hospitalized in the Russian Federation with a diagnosis of ACS (Fig. 1). The median number of hospitalized patients per year with ACS during these two years was 516,128: 366,026 with NSTE-ACS, 150,102 with STEMI. Over the same period of time, the total number of hospitalizations for ACS per 1 million of the country's population was 3,612 and 3,408, respectively (Table 1). The ratio of patients diagnosed with STEMI/NSTE-

ACS ranged from 1/2.6 in 2018 to 1/2.3 in 2019.

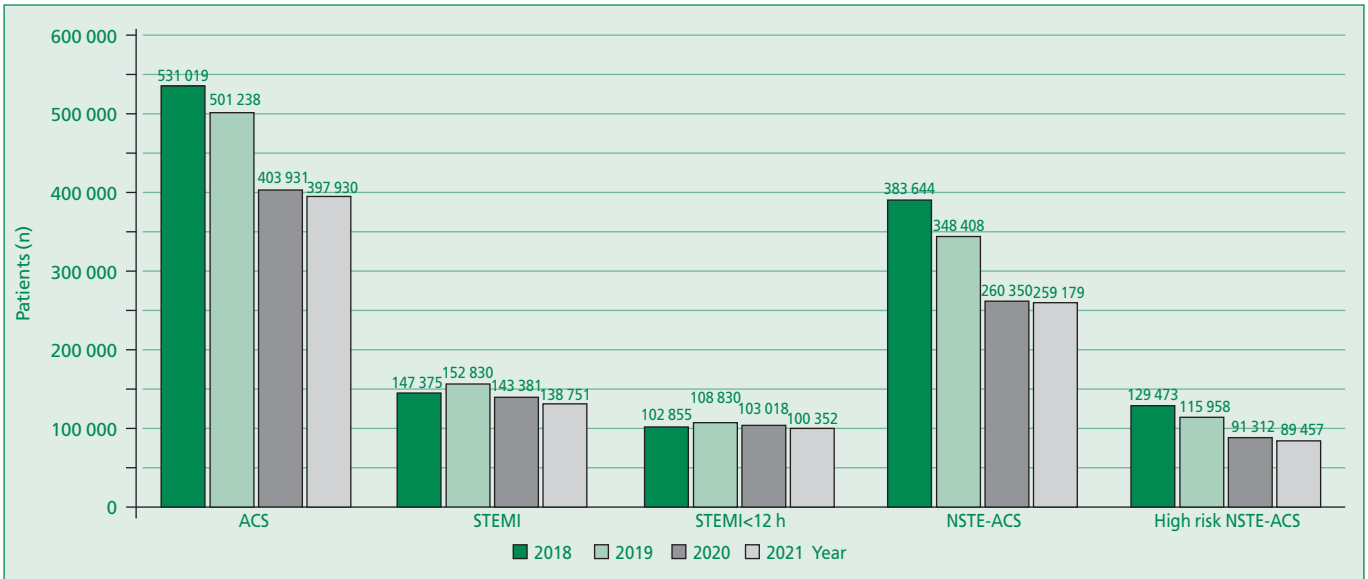
In 2020 and 2021, 403,931 and 397,930 patients, respectively, were hospitalized in the Russian Federation with a diagnosis of ACS (see Fig. 1). The median number of hospitalized patients per year with ACS for 2021-2021 was 400,930 (259,764 with NSTE-ACS, 141,066 with STEMI). The total number of hospitalizations in the country per 1 million population was 2,748 and 2,707 for ACS, respectively. The ratio of patients diagnosed with STEMI/NSTE-ACS ranged from 1/1.8 in 2020 to 1/1.9 in 2021.

Comparison of the indicator of the annual number of hospitalized patients in the Russian Federation with ACS before and during the COVID-19 pandemic revealed: (1) a decrease in the number of patients admitted to hospitals with a diagnosis of ACS by 22.32% (from 516,128 to 400,930 hospitalizations per year, respectively); (2) a decrease in the number of patients admitted to hospitals in the Russian Federation with a diagnosis of NSTE-ACS by 29.03% (from 366,026 to 259,764 hospitalizations per year, respectively); (3) a decrease in the number of patients admitted to hospitals with a diagnosis of NSTEMI by 6.02% (from 150,102 to 141,066 hospitalizations per year, respectively); (4) fundamentally changed ratio of patients diagnosed with STEMI/NSTE-ACS (from maximum values 1:2.3-2.6 to minimum values 1:1.8-1.9, respectively).

We obtained the following results when comparing the dynamics of the hospitalization rate of the most severe subgroups of patients with ACS (high-risk NSTE-ACS and STEMI admitted to the hospital within 12 hours from the onset of symptoms) before and during the pandemic: (1) a decrease in the number of annual hospitalizations of patients with NSTE-ACS high risk by 26.34% (from 122,715 to 90,384 hospitalizations per year); (2) a decrease in the number of annual hospitalizations of patients with STEMI<12 h during the COVID-19 pandemic by 3.64% (from 105,842 to 101,985 hospitalizations per year).

Comparison of quantitative and qualitative indicators of myocardial revascularization in patients with STEMI in the Russian Federation in 2018-2021.

Compared with the indicators in the period 2020-2021 and 2018-2019 in the Russian Federation, we noted an increase in the number of all percutaneous coronary interventions (PCI) for STEMI (an increase of 14.8% in 2019 vs. 2018, with an increase of 9.6% in 2021 vs. 2020), as well as an increase in the number of cases of primary PCI [PPCI – PCI for symptom-dependent stenosis performed within 12 h of the onset of STEMI symptoms in a patient not previously treated with thrombolytic therapy (TLT)] (an increase of 17.5% in 2019 vs. 2018, with an



ACS – acute coronary syndrome, STEMI – ST elevation myocardial infarction, STEMI<12 h – patients with ST elevation myocardial infarction hospitalized within 12 hours of symptom onset, NSTE-ACS – non-ST elevation acute coronary syndrome

Figure 1. Number of patients with various forms of acute coronary syndrome hospitalized in hospitals of the Russian Federation in 2018-2021

Table 1. Change in the number of hospitalized patients with various forms of acute coronary syndrome in the Russian Federation in 2018-2021

ACS forms	Before the COVID-19 pandemic		COVID-19 pandemic	
	2018	2019	2020	2021
All ACS forms, n per 1 million population	3612	3410	2748	2707
NSTE-ACS, n per 1 million population	2610	2370	1771	1763
High-risk NSTE-ACS, n per 1 million population	881	789	621	609
STEMI, n per 1 million population	1003	1040	975	944
STEMI<12 hours from symptom onset, n per 1 million population	670	738	700	687

ACS – acute coronary syndrome, NSTE-ACS – acute coronary syndrome without electrocardiogram ST elevation, STEMI – myocardial infarction with electrocardiogram ST elevation.

increase of 10.3% in 2021 vs. 2020; Table 2). At the same time, we note an increase in the average annual number of PCI for STEMI by 6.5% (from 89,389 to 95,166) and PPCI by 12.6% (from 58,967 to 66,395) during the pandemic compared to the period before the COVID-19 pandemic.

In 2020-2021, the most priority method of reperfusion for STEMI, PPCI, reached its maximum value in 2021, when stenting within 12 hours of MI in the Russian Federation was performed in 50.2% of all patients hospitalized with STEMI (Fig. 2). This important indicator increased by 13.4% compared to 2018. The total number of cases of TLT decreased from 27.3% in 2018 to 23.1% in 2021. The total number of patients without reperfusion in 2021 reached 26.7%, up from 35.9% in 2018.

The pharmacoinvasive approach (TLT + PCI within 24 hours from the onset of TLT) became more actively used during the pandemic years (see Table 2, Fig. 3). Their average number compared to 2018-2019 increased by 10.2% and in 2021 amounted to 60% of the total number of patients who received a thrombolytic drug.

Such qualitative indicators of revascularization in STEMI as the time intervals «symptom-balloon», «symptom-call» and «call-balloon» didn't change in 2018-2021. (Table 3).

Table 2. Change in quantitative indicators of reperfusion therapy for STEMI in the Russian Federation in 2018-2021

Parameter	Before the COVID-19 pandemic			COVID-19 pandemic		
	2018	2019	Average value	2020	2021	Average value
PCI for STEMI, n	83243	95536	89389	90817	99515	95166
PPCI, n	54221	63713	58967	63133	69658	66395
PPCI, % (от STEMI)	36.8	41.4	39.1	44	50.2	47.1
PPCI, % (of PCI for STEMI)	65.1	66.7	66	69.5	70	69.7
TLT, n	40221	38682	39451	34295	32116	33205
TLT, % (of STEMI)	27.3	25.3	26.3	24	23.1	23.6
Without reperfusion, n	52907	47746	50326	48906	37046	42976
Without reperfusion, % (of STEMI)	35.9	33.3	34.6	32	26.7	29.3
After PCI, n	29022	31823	30422	27684	29947	28771
After PCI, % (of PCI for STEMI)	34.9	33.3	34	30.5	30	30.3
PPCI, n per 1 million population	369	433	401	429	474	451
TLT+PCI within 24 h, n	14936	18072	16504	17134	19256	18195
TLT+PCI within 24 hours, % (of all TLT)	37	47	42	50	60	55

STEMI – myocardial infarction with electrocardiogram ST elevation, PCI – percutaneous coronary intervention, PPCI – primary percutaneous coronary intervention, TLT – thrombolytic therapy

PCI symptom-dependent stenosis performed within 12 hours of the onset of STEMI symptoms in a patient who had not previously received thrombolytic therapy.

In the present study, patients with STEMI who underwent PCI within 12 to 48 hours of symptom onset were excluded from the PPCI group. It's difficult to single out such a group of patients, since it's small in number, and its analysis is not presented in the monitoring of the Russian Ministry of Health.

pPCI – primary percutaneous coronary intervention (performed within 12 hours from the onset of STEMI symptoms in a patient who did not previously receive thrombolytic therapy), TLT – thrombolytic therapy, STEMI – ST elevation myocardial infarction
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Figure 2. Emergency myocardial revascularization for STEMI in the Russian Federation in 2018-2021

TLT+PCI 24 h – patients who received TLT and underwent PCI within 24 h; TLT without PCI - patients after TLT who did not receive PCI within 24 hours.
PCI – percutaneous coronary intervention, TLT – thrombolytic therapy, STEMI – ST elevation myocardial infarction

Figure 3. Thrombolytic therapy completed by PCI within 24 h (pharmacoinvasive approach) and isolated TLT for STEMI in the Russian Federation in 2018-2021

The pandemic significantly affected the main qualitative indicator of the treatment of patients with STEMI, mortality. Compared to 2018-2019, during the pandemic years, the average annual mortality rate in the general group of patients with STEMI increased by 12.3% (from 13.6% to 14%), and with PPCI it increased by 9.6% (from 5.7% to 6.25%, Fig. 4).

Comparison of quantitative and qualitative indicators of myocardial revascularization in patients with NSTE-ACS in the Russian Federation in 2018-2021

The dynamics of the number of cases of PCI in NSTE-ACS differed from the dynamics of the relative rates of PCI in NSTE-ACS in the periods before and after the pandemic. We noted a decrease in the average annual number of patients undergoing PCI with NSTE-ACS during the pandemic compared with the pre-pandemic period (by 2.7%; from 87,823 to 85,472, respectively). At the same time, the proportion of PCI in NSTE-ACS increased by 37.1% (from 24% to 32.9%, respectively) in the years of the pandemic compared to the period before the pandemic. A similar situation can be traced for the high-risk group of patients with NSTE-ACS. The absolute numbers of average annual PCI rates for high-risk patients decreased by 3.9% during the pandemic, while the relative numbers increased by 28.8% (Table 4).

During the pandemic, the results of treatment of patients with NSTE-ACS have significantly worsened. We observed an increase in mortality in all analyzed subgroups of patients. In the general group of patients with NSTE-ACS, annual mortality increased by an average of 48% (from 2.7% before the pandemic to 4.0% during the pandemic), in the PCI subgroup with NSTE-ACS, the annual mortality increased by an average of 28.6% (from 1.4% to 1.8%, respectively), after PCI with high-risk NSTE-ACS, the annual mortality increased by an average of 27.2% (from 2.2% to 2.8%, respectively).

Discussion

Literature data indicate a decrease in the number of hospitalizations of patients with various forms of ACS during the COVID-19 pandemic [3, 4, 6–8, 10, 21], which is confirmed by our study data (see Table 2 and Fig. 1). The decrease in the number of patients diagnosed with ACS admitted to hospitals in the Russian Federation by 22.32% during the

Table 3. Change in the quality indicators of primary percutaneous coronary intervention for STEMI in the Russian Federation in 2018-2021

Parameter	Before the COVID-19 pandemic			COVID-19 pandemic		
	2018	2019	Average value in 2018-2019	2020	2021	Average value in 2020-2021
«Symptom-balloon» time, min	238	223	230	231	233	232
«Symptom-call» time, min	118	115	116	123	125	124
«Call-balloon» time, min	120	108	114	108	108	108

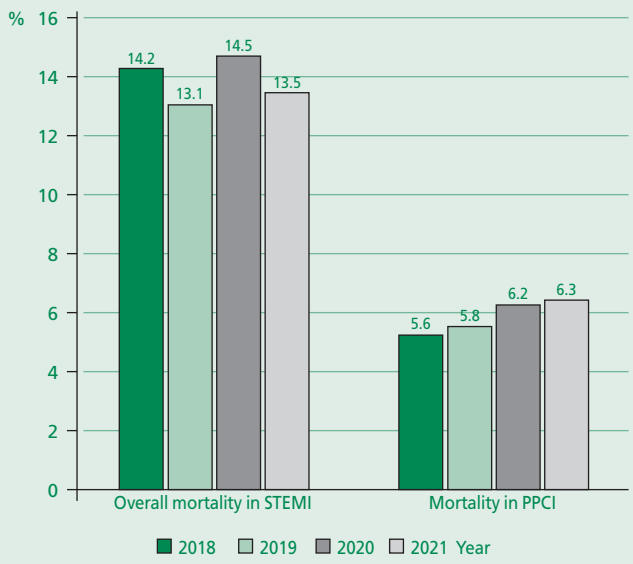
The «symptom-balloon» time is the time from the onset of STEMI symptoms to the restoration of antegrade blood flow in the infarct-dependent artery. The «symptom-call» time is the time from the onset of STEMI symptoms to the patient's access to an ambulance (the time of «patient's responsibility»). The «call-balloon» time is the time from the moment a STEMI patient's access to an ambulance until the restoration of antegrade blood flow in the infarct-dependent artery (the time of responsibility of the «health care system»).

years of the pandemic was mainly due to a significant decrease in hospitalizations of patients with NSTE-ACS (by 29.03%). At the same time, the admission of patients with STEMI decreased only by 6.02%. This redistribution of hospitalizations between forms of ACS has reduced the ratio of patients with STEMI/NSTE-ACS from the maximum values in the pre-pandemic period (1:2.3 - 2.6) to the minimum values (1:1.8 - 1.9) for all years since 2016 [13], during the pandemic. Moreover, these values have reached the average European figures, which were recorded, for example, in Sweden before the active spread of coronavirus infection [16].

During the COVID-19 pandemic, the number of hospitalized patients in the main subgroups of ACS has changed. If the number of patients with STEMI <12 hours remained practically the same (reduction by 3.64%), then hospitalization of the most prognostically unfavorable group of ACS (high-risk NSTE-ACS) decreased by 26.24%. The study of the reasons for the decrease in the number of hospitalizations of patients with ACS during the pandemic in domestic practice was not the subject of this analysis. However, according to the literature, the reduction in the admission of patients to hospitals can be due both to the fear of citizens of being infected with COVID-19 in the hospital, and incorrectly established diagnoses against the backdrop of overloading the healthcare system, taking into account employment in the treatment of infectious pathology [3, 4, 21] .

The dynamics of reperfusion therapy with STEMI in the Russian Federation during the COVID-19 pandemic is in conflict with the laws of logic and data obtained from European countries.

The results of the European ISACS-STEMI COVID-19 registry, which included 6,609 patients with STEMI from 18 countries, showed that during the



pPCI – primary percutaneous coronary intervention (performed within 12 hours from the onset of STEMI symptoms in a patient who did not previously receive thrombolytic therapy), TLT – thrombolytic therapy, STEMI – ST elevation myocardial infarction

Figure 4. STEMI mortality in the Russian Federation in 2018-2021

period of active spread of a new coronavirus infection, compared with the same time interval before the pandemic, the number of cases of PPCI significantly decreased (by 17%), time delays in PPCI increased («symptom-balloon» time increased by an average of 29 min) and STEMI mortality increased (by 38.8%) [4, 5, 8]. And according to the monitoring results of the Ministry of Health of the Russian Federation, an increase in the average annual number of PPCI by 12.6% is noted (from 58,967 to 66,395) during a pandemic compared to the period 2018-2019 (see Table 2). This is also confirmed by the increased average annual number of PPCI per 1 million population during the pandemic (451 vs 401, respectively).

According to the founding documents of the European Stent For Life Initiative, quantitative targets

Table 4. Changes in quantitative and qualitative indicators of revascularization in non-ST elevation acute coronary syndrome in the Russian Federation in 2018-2021

Parameter	Before the COVID-19 pandemic			COVID-19 pandemic		
	2018	2019	Average value	2020	2021	Average value
PCI for NSTE-ACS, n	84218	91429	87823	78461	92483	85472
PCI for NSTE-ACS, % (of NSTE-ACS)	22	26	24	30.1	35.7	32.9
PCI for high-risk NSTE-ACS, n	46269	48263	47266	42379	48430	45404
PCI for high-risk NSTE-ACS, % (of NSTE-ACS)	35.7	42	38.8	46	54	50
Mortality for NSTE-ACS, %	2.7	2.7	2.7	4.1	3.9	4
Mortality during PCI in NSTE-ACS patients, %	1.4	1.4	1.4	1.8	1.8	1.8
Mortality during PCI in high-risk NSTE-ACS patients, %	2.1	2.3	2.2	2.8	2.9	2.8

NSTE-ACS – acute coronary syndrome without electrocardiogram ST elevation, PCI – percutaneous coronary intervention

for PPCI have been defined, which should be performed in at least 70% of the total number of patients with STEMI or an absolute number equal to more than 600 PPCI per 1 million population at the national level. In our country, the PPCI rate doubled from 2016 to 2021 (from 25% to 50%), and the PPCI rate per 1 million population increased by 1.65 times (from 276 to 451, respectively).

Also, an increase in the average «symptom-balloon» time by only 2 minutes was recorded during the years of the COVID-19 pandemic when compared with 2018-2019 (see Table 3).

Mortality in the Russian Federation with STEMI also increased against the background of coronavirus infection, but its increase was more than 3 times lower than in Europe (the average mortality rate in the general group of STEMI patients increased by 12.3% (from 13.6% to 14, 0%), and the average mortality per year during PPCI increased by 9.6% (from 5.7% to 6.25%; see Fig. 4).

The absolute, relative and estimated increase in the number of PPCI procedures (priority reperfusion method for STEMI) in Russia during the COVID-19 pandemic contradicts European data published in January 2022 [21]. The explanation for this may be the fact that domestic X-ray endovascular care for patients with STEMI has not yet reached the maximum level and plateau. In the Russian Federation, the number of PPCI procedures continues to grow annually [13]. It slowed down due to the unfavorable epidemiological situation in 2020, but resumed growth in 2021 (see Table 2). European researchers analyze only the first two months of the very beginning of the COVID-19 pandemic [4, 5, 8, 21], when many organizational and medical decisions were not yet worked out. The results of this domestic analysis cover two years before the COVID-19 pandemic (2018-2019) and during the pandemic (2020-2021). It's likely that the healthcare system of the Russian Federation to a certain extent adapted to the prevailing conditions during the two years of the pandemic, which led to a not very significant increase in mortality, as in European countries at the beginning of the pandemic.

The limited possibilities of performing PPCI by regional vascular centers in an unfavorable epidemiological situation should be the basis for expanding the use of TLT, as presented in the national guidelines [12], but in real life in the country, the situation didn't have the character of a direct relationship between pandemic and increase in TLT. In this sense, the negative dynamics of TLT therapy for STEMI looks illogical, the frequency of which decreased by 15.8% in 2020-2021 (see Table 2). But we need to note an increase in the frequency of using the pharmacoinvasive approach from 2018 to 2021 by 1.62 times (from 37% to 60% of the total number of patients who received a thrombolytic drug). This fact logically fits into the concept of increasing the priority of the pharmacoinvasive strategy in the face of the difficulties that arose during the organization and conduct of PPCI, which took place during the pandemic (see Fig. 3).

In foreign literature, the results of the impact of the COVID-19 pandemic on myocardial revascularization in NSTE-ACS are not as widely presented as in STEMI. However, during the pandemic, a decrease in the number of hospitalized patients with NSTE-

ACS of up to 50% was reported in Germany, Austria and Italy [3, 18, 19], and the number of PCI for patients diagnosed with NSTE-ACS in Switzerland decreased by 21% [20], and mortality in NSTE-ACS increased by 39% (from 5.4% to 7.5%) in the UK [17]. In the Russian Federation during the pandemic years, the average number of PCI procedures for NSTE-ACS decreased by only 2.7%, while the proportion of PCI for NSTE-ACS increased by 37.1%. Mortality during the pandemic also increased in all subgroups of patients with NSTE-ACS (maximum in the general group (by 48%), minimum after PCI for high-risk NSTE-ACS (by 27.2%; see Table 4). During the years of the pandemic, a decrease in the number of hospitalized persons with NSTE-ACS was revealed by 29.03% in the Russian Federation vs 50% in European countries. At the same time, mortality increased by 48% in the Russian Federation vs 39% in the UK. Domestic data are synchronous and comparable with the literature data [3, 17-20]. At the same time, a slight reduction in the number of PCI procedures (by 2.7%) and an increase in their proportion (by 37.1%) fundamentally distinguishes the dynamics of domestic myocardial revascularization in NSTE-ACS from European revascularization [20]. The number of PCIs for NSTE-ACS in the Russian Federation has not changed as dramatically as in Europe due to the insufficient level and continuing annual growth of this type of endovascular care in domestic practice.

Conclusion

The decrease in the number of patients diagnosed with ACS admitted to hospitals in Russia by 22.32% during the years of the COVID-19 pandemic (2020-2021) was mainly due to a 29.03% decrease in hospitalizations of patients with NSTE-ACS. It's fundamentally important that the admission of patients with STEMI decreased by only 6.02%. In 2021, in the Russian Federation, PPCI was performed in 50.2%, TLT was performed in 23.1%, and 26.7% of patients remained without reperfusion. Pharmacoinphasive strategy was used in 60%, and isolated thrombolysis was used in 40% of patients.

During the pandemic, myocardial revascularization in patients with ACS in the Russian Federation corresponded to the following trends recorded in the literature: mortality increased in patients with ACS during PPCI (by 9.6%) and in the general STEMI group (by 12.3%), as well as mortality both in the general group (by 48%) and during PCI (by 28.6%) in patients with NSTE-ACS.

The indicators of myocardial revascularization in ACS in the Russian Federation during the pandemic were fundamentally different from those in Western countries: we noted an increase in the average annual number of PPCI (by 12.6%), including per 1 million population (up to 451), as well as an increase in the average «symptom-balloon» time (by 2 min) with a decrease in the number of PCI procedures (by 2.7 %) and an increase in its proportion in NSTE-ACS (by 37.1%).

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About the Authors:

Bagrat G. Alekyan
ORCID 0000-0001-6509-566X

Sergey A. Boytsov
eLibrary SPIN 7961-5520, ORCID 0000-0001-6998-8406

Vladimir I. Ganyukov
ORCID 0000-0002-9704-7678

Elena M. Manoshkina
ORCID 0000-0001-6161-440X