Clinical and Laboratory Features of Covid - 19 Course in Combination with Pneumonia

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Abstract: Relevance. The first outbreak of COVID-19 was recorded in December 2019, in Wuhan, China. Four months after the outbreak, WHO announced the COVID-19 pandemic (March 11, 2020), which indicates the high contagiousness of this infection. The entrance gates of the pathogen are the epithelium of the upper respiratory tract, epithelial cells of the stomach and intestines. The initial stage of infection is the penetration of SARS-CoV-2 into target cells that have type II angiotensin-converting enzyme receptors(ACE2 — angiotensin-converting en¬zyme 2). The novel human corona virus can cause a range of diseases, from mild acute respiratory infections to severe acute respiratory syndrome (SARS). Extra pulmonary manifestations include: bleeding disorder, myocardial dysfunction and arrhythmia, acute coronary syndrome, acute renal failure, gastrointestinal disorders, hepatocellular damage, hyperglycemia and ketosis, neurological diseases, eye symptoms and dermatological complications.

Materials and research methods. The data of examination and treatment of 102 patients with moderate severity of the course of COVID-19 were analyzed. Treated from July to August 2020 in a specialized hospital formed for the treatment of patients with COVID-19, the Bukhara State Medical Institute in the dormitory of the Bukhara Technological Institute. When assessing the condition and method of treatment, we were guided by temporary recommendations for the management of patients infected with COVID-19 - No. 7 approved by the Ministry of Health of the Republic of Uzbekistan dated 15. 08. According to the protocol, patients with COVID - 19, depending on the severity of the disease, are divided into 4 groups. The protocol contains specific recommendations on the scope of examination and treatment, taking into account the severity of the patient's condition.

Conclusions. When assessing the condition of patients with COVID - 19 associated pneumonia, indicators of intoxication, blood coagulation and SpO2% of blood are important. The main criteria for assessing the state of the coagulogram in COVID-19 are: D-dimer; PT; Platelets; Fibrinogen blood.

Keywords: COVID - 19, SARS-CoV-2, COVID 19 - associated pneumonia.

Relevance. The first outbreak of COVID - 19 was recorded in December 2019 in Wuhan, China. Four months after the outbreak, WHO declared a COVID-19 pandemic (March 11, 2020), which indicates the high contagiousness of this infection [1;]. The entrance gates of the pathogen are the epithelium of the upper respiratory tract, the epitheliocytes of the stomach and intestines. The initial stage of infection is the penetration of SARS-CoV-2 into target cells that have type II angiotensin-converting enzyme receptors (ACE2 - angiotensin-converting enzyme 2) [2;]. The novel human corona virus can cause a range of illnesses, from mild *f*orms of acute respiratory infection to severe acute respiratory syndrome (SARS). Extra pulmonary manifestations include: bleeding disorders, myocardial dysfunction and

arrhythmia, acute coronary syndrome, acute renal failure, gastrointestinal disorders, hepatocellular damage, hyperglycemia and ketosis, neurological diseases, eye symptoms and dermatological complications [3;].

COVID-19 induced hypercoagulability is explained by endothelial cell dysfunction, which in turn leads to excessive thrombin production and decreased fibrinolysis activity [4;]. The ability of corona viruses to penetrate directly into the bone marrow and disrupt the processes of hematopoietic is not excluded. [5;].

Coagulation disorders lead to thrombotic complications that are clinically significant. The resulting micro thrombosis, disrupting the microcirculation, can significantly aggravate the course of acute respiratory failure in patients with COVID-19. Therefore, the treatment of COVID-19 must necessarily include measures aimed at correcting homeostasis disorders. [6;].

Materials and methods.

The data of the examination and treatment of 102 patients with moderate severity of the course of COVID-19, who were treated from July to August 2020 in a specialized hospital formed for the treatment of patients with COVID-19 by the Bukhara State Medical Institute in the dormitory of the Bukhara Technological Institute, were analyzed. When assessing the condition and method of treatment, we were guided by temporary recommendations for the management of patients infected with COVID-19 - No. 7 approved by the Ministry of Health of the Republic of Uzbekistan dated 15. 08. 2020. According to the protocol, patients with COVID - 19 are divided into 4 groups depending on the severity of the disease. The recommendations provide specific recommendations on the scope of examination and treatment, taking into account the severity of the patient's condition.

All patients, depending on sex and age, were divided into groups according to the classification adopted at the regional seminar of the World Health Organization in Kyiv in 1963.

Of the 102 examined patients, 68 (66. 6%) were men, 34 (33. 4%) women, aged 17 to 76 years (the average age was 48. 4±2. 1 years). All examined patients on the day of admission, urgently started complex therapy for the treatment of COVID - 19, drugs based on Protocol No. 7 recommended by the Ministry of Health of the Republic of Uzbekistan.

From the moment of admission, all patients were measured body temperature, respiratory rate, an objective examination of the lungs (auscultation, percussion), pulse oximetry, X-ray examination of the lungs, and, if necessary, MSCT of the chest. When collecting an anamnesis, attention was focused on determining the duration of the disease and the contact of patients with patients with COVID-19.

To determine the level of oxygen saturation of the capillary blood of the body, the SpO2% indicator was studied using a pulse dosimeter apparatus by fixing the apparatus to the end of the phalanx of the patient's hand.

All admitted patients from the day of hospitalization and in dynamics were determined indicators of body temperature and blood intoxication: blood leukocytes, LII, MSM, blood ESR. The indicators of D - dimer were studied; prothrombin time; platelets; blood fibrinogen.

Results and discussions. All examined patients were admitted with COVID - 19 associated pneumonia, which was confirmed by X-ray examination.

As noted above, patients on the day of admission on an emergency basis began conservative therapy in accordance with the temporary recommendations for the management of patients

infected with COVID-19 No. 7. From the moment of admission, all patients underwent - taking a swab from the nasopharynx to verify the diagnosis using the polymerase chain reaction (PCR) method for COVID-19, regardless of clinical manifestations, detection of specific antibodies in the blood (IgA; IgM and / or IgG) to SARS -CoV-2, thermometry, measured respiratory rate. An objective examination of the lungs (auscultation, percussion), pulse oximetry, X-ray examination of the lungs, and, if necessary, MSCT of the chest were performed. Taking into account the results of clinical and radiological studies, all patients, if necessary, underwent oxygen therapy using the CPAP or Bobrov apparatus.

The effectiveness of treatment was assessed by the dynamics of the results of clinical and X-ray studies (X-ray, MSCT). The condition of the lung tissue and the assessment of the degree of lung damage were assessed by MSCT or X-ray studies. The main criterion for the treatment of COVID-19 was the results of a PCR study from the nasopharynx for COVID-19 and the detection of antibodies to SARS-CoV-2 in the blood. Important indicators for assessing the condition of patients were the results of a study of indicators of blood intoxication: blood leukocytes, LII, MSM, blood erythrocyte sedimentation rate, indicators D - dimer; PV; platelets; Blood fibrinogen and MSCT of the lung in dynamics.

Analysis of laboratory indicators of intoxication in the examined patients revealed the following changes (table. 1). As shown in the table, on the first day of treatment, the body temperature of patients averaged 37,80±0,40. The content of blood leukocytes was on average 7,82±0,11 x 10^9/l. MSM volume 0,176±0,008 unit. Similarly, there was an increase in LII and ESR.

Table 1. Dynamics of indicators of intoxication in examined patients with COVID - 19 associated pneumonia (n =102).

Indicators	Observationtime				Referencevalues
	Dayofadmission	3 day	7 day	14 day	
t^0body	37,80±0,40	37,44±0,14***	36,81±0,12***	36,60±0,21	35,6-37,2 ˚C
L blood×10^9/l	7,82±0,11	7,10±0,17***	6,70±0,21*	6,60±0,18*	4,0-9,0 × 10^9/l
MSM unit	0,176±0,008	0,148±0,04	0,122±0,022**	0,128±0,004*	0,240±0,04 cond. unit
LII unit	1,70±0,10	1,30±0,04	1,0±0,03**	1,0±0,03	0,3 – 1,5 unit
ESR mm/h	45,60±1,28	41,40±1,21	34,70±2,11*	25,20±2,10***	2-15 mm/h

Note: * - significance of the difference relative to the data of the previous day Significant (* - P<0,05, ** - P<0,01, *** - P<0,001).

On the third day of treatment, there is a slight decrease in body temperature to 37,44±0,14, the number of leukocytes in the blood decreased to an average of 7,10±0,17×10^9/l. The volume of medium molecules averaged 0,148±0,04 unit. There was a decrease in LII and ESR to 1,30±0,04 and 41,40±1,21 accordingly.

By the seventh day of treatment, the examined diseases remain febrile (36,81±0,12). At the same time, for all laboratory indicators of intoxication of the body: L, MSM, LII and ESR of blood, their further decrease was noted, that is, a tendency towards normalization was outlined. – 6, 70±0,21×10^9; 0,122±0,022; 1,0±0,03; 34,70±2,11 accordingly. By the fourteenth day of treatment, these indicators, although they tended to further normalization, remained above the norm. .

With further treatment and observation, by the seventh day, all analyzed indicators of intoxication, except for blood ESR, were within the reference values. .

In the following, the condition of the patients was studied according to the indicators of pulse oximetry - SpO2 %. Upon admission, patients showed a slight deviation of SpO2 % from normal values, that is - 93, 60±0,06 %(table 2).

Table2. Dynamics of pulse oximetry indicators of examined patients (n=102)

IndicatorSpO$_2$ %				Normalvalues
Dayofadmission	3 days	7 days	14 days	SpO2 % according to WHO (2009year). SpO$_2$ - 95% orhigher
93,60±0,06	93,80±0,11	94,10±0,30	95,20±0,40*	

Note: * - significance of the difference relative to the data of the previous day Significant (* - P<0,05, ** - P<0,01, *** - P<0,001).

Against the background of therapy, pulse oximetry parameters SpO2% slowly tended to normalize. By the third day of treatment, the dynamic growth curve of SpO2% was insignificant. By the 6-7th day of treatment, there was a positive trend in SpO2%, reaching up to digits 94, 10%±0,30, which corresponds to the lower limit of normal. On average, the increase in the oxygen saturation of tissues at this period reached up to 0. 5% of the initial. In the future, with a dynamic increase by the 14th day - up to 95,20%± 0,40, which significantly differs from the baseline by an average of 2. 14%.

To verify the diagnosis of COVID - 19, as indicated above, all patients underwent a PCR study from the nasopharynx. It should be noted that 2% of patients at the time of admission had confirmed results of PCR testing for COVID-19. The rest of all patients with PCR were tested for COVID-19 on the day of admission. According to the results of a PCR study, 45% of patients had a false positive test result for corona virus, 55% of patients had positive PCR tests. Taking into account the presence of clinical signs such as: anomie, headaches, fever, patients in whom the PCR study showed a false negative or negative result, a diagnosis of COVID - 19 was made All of these patients had a history of contact with patients with COVID - 19 in the last 14 days prior to admission. 70% of patients in the family had patients with confirmed tests for COVID-19.

A dynamic study of hemostasis parameters of the examined patients revealed the following indicators: D-dimer on the day of admission was above the norm, which averaged 1535 ng/ml;The indicator of prothrombotic time was - 14 sec; Platelets and Fibrinogen were above the norm 202 * 10 ^ 9 / l, and 4. 3 g / l, respectively. Table 3

Table 3. Indicators of hemostasis in the examined patients (n=102)

Indicator	Indicatorindynamics				
	Dayofadmission	3 days	7 days	14 days	reference values
D-dimer	1535 ng/ml	955 ng/ml	544ng/ml	353ng/ml	0-500 ng/ml
PT	14sec	12 sec	11sec	11 sec	11—16 csec
Platelets	202 *10^9/l	184 *10^9/l	175 *10^9/l	170 *10^9/l	150 - 400 *10^9/l
Fibrinogen	4,3 g/l	4,1 g/l	4,0 g/l	4,0 g/l	2—4 g/l

Note: * - significance of the difference relative to the data of the previous day Significant (* - P<0,05, ** - P<0,01, *** - P<0,001).

Against the background of complex treatment with the use of heparin anticoagulants and low

molecular weight heparins (Clexane, Enoxiparin), all these indicators in dynamics gradually returned to normal by the 7–8th day of treatment.

The main X-ray signs of COVID-19 associated pneumonia in the examined patients were the following symptoms: numerous ground-glass seals of the lung tissue, involving up to 25-40% of the lung parenchyma, occurred in 68 (66. 6%) patients, similar to hazy compaction of the lungs, with preservation of the contours of the bronchi and blood vessels**.**

Less commonly, CT scans showed signs of: areas of consolidation, perilobular seals in 19 (18. 6%) patients; air bronchogram symptom, traction bronchiectasis in 7 (6. 8%) patients; pleural effusion, hydrothorax in 2 (1. 9%) bilateral, predominant on the left. All these signs were mainly determined on the 6th–10th day diseases.

In the process of complex treatment, synchronously with the improvement of the general condition and clinical and laboratory data of the examined patients, the CT picture also had a positive trend. By 7-8 days of treatment, in most cases, the examined patients had normal CT pictures, it should be noted that in 20-25% of patients at this period of treatment, CT scans showed residual effects of the x-ray picture. .

CONCLUSIONS:

1. When assessing the condition of patients with COVID-19 associated pneumonia, the MSCT picture, indicators of intoxication and SpO2% of blood are important.

2. The main criteria for assessing the state of the coagulogram in COVID-19 are: D-dimer; PV; platelets; fibrinogen blood.

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