

# A Case of Two Cardiac Arrests in a Pregnant Woman with Severe Covid-19 Pneumonia

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## Abstract

**Background:** COVID-19 pneumonia increases the risk for pregnant women and the fetuses that often require intensive therapy. In addition to obvious therapeutic targets, ICU staff has to control the psycho-emotional conditions of COVID-19 patients, e.g. intensive care unit syndrome and post-intensive care syndrome. **Case presentation:** Patient M., Uzbek, 24 years old, gravida 1 (27 weeks) was admitted to the Maternity Department of Zangiota hospital on 19.07.2021 with the diagnosis of extremely severe COVID-19 pneumonia and respiratory failure with psychomotor agitation. On day 4 her general condition deteriorated due to the progression of pneumonia and involvement of abdominal organs associated with 27-week pregnancy. On that day the fetus had no signs of life, and the caesarean delivery was performed; the child was stillborn. For the next two weeks the patient had been in medical coma due to the progression of respiratory and multi-organ failure. The patient had two separate cardiac arrests. Cardio-pulmonary resuscitation was successful. By day 20, the dynamics of her cardiac activity has been completely restored. The brain function restored to 15 on the Glasgow Coma Scale. **Conclusion:** Special measures of prevention and treatment of multi-organ failure, intensive care unit syndrome and post-intensive care syndrome should be taken in an ICU for pregnant women with COVID-19 pneumonia.

## Keywords

Cardiac Arrest, Pregnant Women, COVID-19 Pneumonia, Psychomotor Agitation, Intensive Care Unit Syndrome

## 1. Background

Development of intensive care unit syndrome (ICUS) and post-intensive care

syndrome (PICS) is the most difficult problem of current critical care. It is a rather often consequence of long mechanical ventilation of patients or development of multi-organ failure (MOF). The designation of ICUS and PICS as separate nosological forms including psychological, cognitive and physical disorders (among others, polyneuropathy, respiratory dysfunction, muscle and joint atrophy, etc.), is necessary today because they have acquired urgency and are associated with a long stay of patients with COVID-19 pneumonia in an ICU and their subsequent rehabilitation in the post-COVID period [1] [2] [3] [4].

This problem is particularly critical in pregnant women with COVID-19 pneumonia who inevitably will have a reciprocal burden of several psychosomatic and cognitive factors. Screening and treatment of these disorders are now carried out more frequently, but no method has been shown to be sufficiently effective. The number of patients, who survived hospitalization in an ICU, is increasing, and PICS treatment is a serious problem indeed [5]. At the same time, introduction of special measures of prevention and treatment of MOF and ICUS is a complex task that should meet the significant therapeutic and technical requirements of intensive care [6] [7].

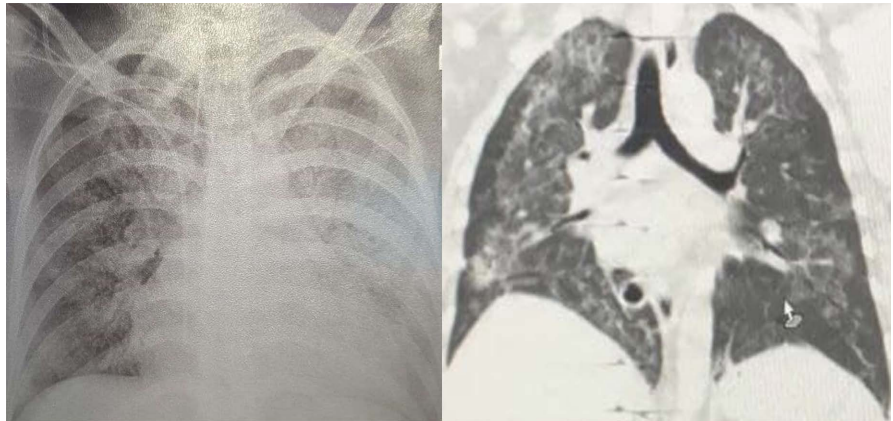
Given the fact that there appeared a disease, unknown earlier and unpredictable so far, that changed many well-established clinical views and methodological approaches, only cases from clinical practice can provide the most obvious picture of COVID-19 clinical development in pregnant patients and all complications associated with it as well as demonstrate the accuracy of the chosen tactics and rehabilitation program.

## 2. Case Presentation

Patient N., Uzbek, 24 years old, gravida 1 (27 weeks) was admitted to the Maternity Department of hospital Zangiota 1 on 19.07.2021 with the diagnosis of extremely severe COVID-19 pneumonia. Her critical condition was caused by respiratory failure with psychomotor agitation. The examination revealed an active participation of auxiliary muscles in the act of respiration with RR more than 35 - 40 min. Her chest X-ray and MSCT showed bilateral polysegmental lesions (about 64%) of pulmonary tissue (**Figure 1**). Her SpO<sub>2</sub> on admission was 84% - 86%, arterial blood pO<sub>2</sub> was 45 mm Hg.

The patient immediately received respiratory support with NIV in CPAP mode with the following parameters: P<sub>supp</sub> = 14 mbar, PEEP = 8 mbar, FiO<sub>2</sub> = 70% with positive effect, a SpO<sub>2</sub> rise to 94% - 96% within 3 hours with an increase in oxygenation index (pO<sub>2</sub>) by more than 15% (from 86 to 105 mm Hg).

However, on day 4 her general condition deteriorated; a negative trend in respiratory mechanics developed with a decrease of SpO<sub>2</sub> to 89% - 91%; the static complex of lungs dropped to 20 ml/cm of water column, and oxygenation index decreased to 94 mm Hg. This was an indication of progression of pneumonia and involvement of the abdominal compartment owing to 27-week pregnancy. That day the fetus had no signs of life. The council of physicians came to conclusion



**Figure 1.** X-ray and MSCT images of lungs in patient N. upon admission.

that caesarean delivery should be performed to the patient. The caesarean section was performed, the child was stillborn.

For the next two weeks the patient had been in medical coma due to the progression of respiratory and multi-organ failure (hypocoagulation syndrome, acute hepatic-renal failure) requiring vasopression and brain protection (cranial hypothermia and neuroprotection). During this period, the patient had two separate cardiac arrests against the background of bradycardia. Cardio-pulmonary resuscitation (CPR) was successful. By day 20 of the patient's stay in the ICU, the dynamics of cardiac activity had been completely restored (administration of vasopressors, inotropic drugs and sedatives was stopped). Restoration of brain function to 15 on the Glasgow Coma Scale had been recorded for three days after cancellation of sedation.

Initial respiratory support was provided by a non-invasive ventilator in CPAP mode,  $P_{\text{supp}} = 14$  mbar,  $PEEP = 8$  mbar,  $FiO_2 = 70\%$ . At the same time  $SpO_2$  saturation rose to 94-96% within 3 hours with an oxygenation index increase by more than 15%, from 86 to 105 mm Hg.

However, on day 4 of the patient's stay in the ICU her general condition aggravated; a negative trend in the indicators of breathing mechanics became obvious with a decrease in saturation, respiratory complex (up to 20 ml/cm of water column), and oxygenation index (up to 94 mm Hg). This indicated a transition of the pathomorphological stage to a fibroblastic phase with small volumes of lung tissue involved in gas exchange.

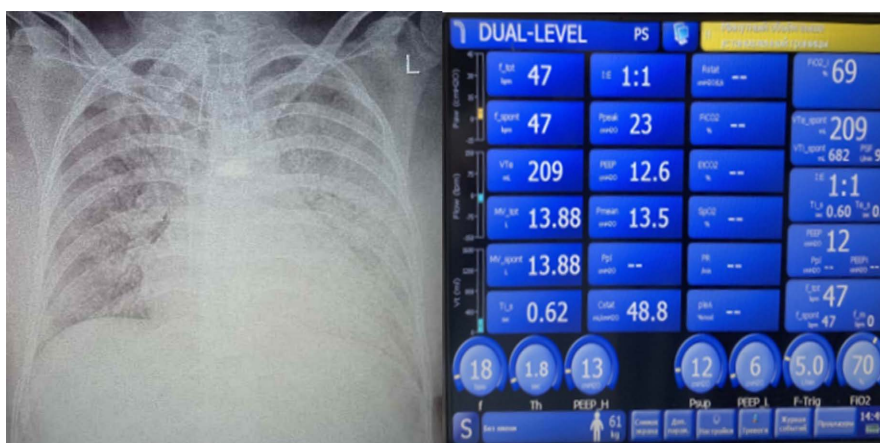
The patient was intubated on day 7 of her stay in the ICU and a percutaneous tracheostomy was performed three days later. The BiPAP (Dual Level) ventilator mode was chosen, and within 3 hours of respiratory therapy the patient's hemodynamics stabilized, saturation rose from 63% to 88% (**Figure 2**).

On day 20 in the ICU and day 13 of tracheostomy, instability of hemodynamics and asystole was recorded with critical values of respiratory mechanics indicators. Eight-minute CPR restored her cardiac activity with  $ABP = 60/40$  mm Hg,  $HR = 120$  bpm, at  $SpO_2 = 60\% - 68\%$ . Mode P-SIMV of forced ventilation with parameters  $f = 18$  per minute,  $Insp = 1.5$  sec,  $P_{\text{insp}} = 30$  mbar,  $PEEP = 10$  mbar,

Psupp = 10 mbar, Trigger 2.0 l, FiO<sub>2</sub> = 100% was used. Vasopressor support (i.v. norepinephrine infusion at 0.04 ug/kg/min) was added.

After successful CPR the patient's respiration mechanics were characterized by a low RMV of up to 4 - 5 l/min, low lung-thorax compliance of 20 - 26 ml/cm of water column, and a poor response to PEEP equal to 6 - 10 cmH<sub>2</sub>O. In this regard, the pressure-controlled mechanical ventilation modes, higher PEEP (>10 mbar) and Psupp more than 14 mbar had been used for 3 days while maintaining the target RV to 4 - 6 ml/kg. Daily tests were conducted to change from P-SIMV or BiPAP to 4-hour CPAP support via the tracheostoma. These sessions were repeated every 2 hours. The PEEP level was reduced to 5 cmH<sub>2</sub>O on day 17 of the patient's ventilation through the tracheostoma (**Figure 3**).

On ICU day 28 and day 21 on tracheostomy at SpO<sub>2</sub> more than 92%, RV decreased to less than 6 ml/kg, RR not more than 22 per minute, measured for 30 minutes on the background of PEEP = 6 cmH<sub>2</sub>O and FiO<sub>2</sub> = 35% the mechanical



**Figure 2.** X-ray picture of lungs and indicators of respiratory mechanics of pregnant patient N., 24 years old, with COVID-19 associated with severe ARDS; at the time of intubation and tracheostomy.



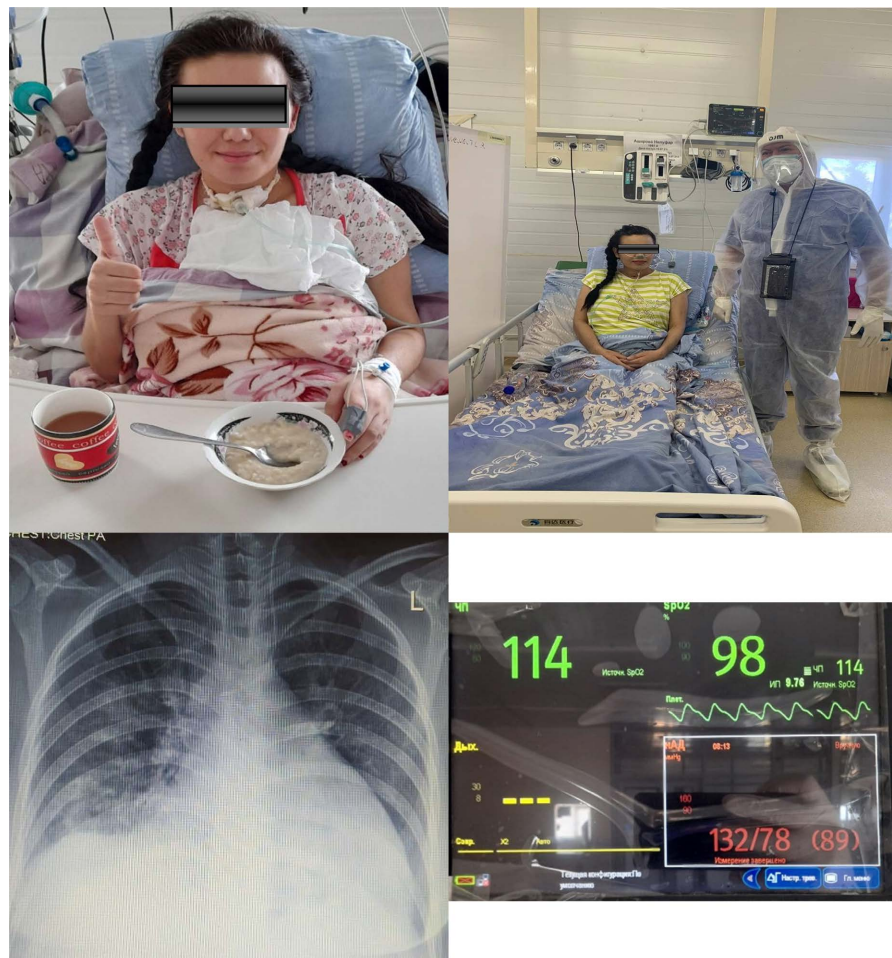
**Figure 3.** The X-ray of the lung and photo of the patient with severe COVID-19 associated ARDS and PTSD on day 17 in the ICU.



ventilation was stopped; the patient was decannulated on day 33 in the ICU (Figure 4).

*Psychosomatic status:* On admission, the patient's condition was assessed as anxious-hypochondriac type of attitude to pregnancy (before the illness, the pregnancy was relatively uneventful). She worried constantly about the development of her pregnancy; various suspicions tortured her, and she felt fear of the upcoming childbirth. However, she did not seek advice of a psychologist. Her severe psychomotor agitation (PMA) on admission was due not only to panic attacks associated with respiratory failure, but was also caused by her fear of the child loss (gravida I). On the GAD-7 scale, her condition was evaluated as 19 points (increased "nervous excitability" = worrying too much about different things and "excessive anxiety" = being restless; "fear of something terrible" = feeling afraid as if something awful might happen prevailed [8]). The patient was consulted by a psychoneurologist soon after admission, and moderate doses of dexmedetomidin (0.2 mg/kg/h by continuous infusion) were prescribed.

In the postpartum period, after the awakening, she demonstrated marked negativism manifested in apathy, indifference to what was happening, unwillingness



**Figure 4.** Condition of 24-year old patient N. with COVID-19 associated severe ARDS, PTSD on day 33 after tracheostomy. Decannulation.

to comply with the medical personnel.

When diagnosing MOF, the patient's condition was rated on the evaluation scale of depression-agitation as "deep depression", *i.e.* awakening only to physical stimulation, lack of contact, disobedience to commands, periodic unconscious chaotic movements. This condition was considered to be severe PTSD.

An active rehabilitation program started according to recommendations of a neurologist and psychotherapist. All medical personnel were focused on removing ICUS. For next 10 days, the patient demonstrated a positive attitude and full contact with the medical staff, active implementation of commands related to hygiene and respiratory rehabilitation. The patient was discharged home because her respiratory and psychomotor activity restored.

### **3. Conclusion**

The clinical case of successful treatment of severe COVID-19 pneumonia in a pregnant woman with a favorable outcome both for a mother and child demonstrates the necessity of early identification and treatment of psycho-emotional disorders before the onset of pregnancy in order to create conditions for a favorable outcome of pregnancy, reduce the risk of loss of pregnancy and dangerous obstetric complications. In cases of anxiety-depression disorders in pregnant COVID-19 patients during their long stay in an ICU that worsen the prognosis, it is advisable to perform appropriate psychodiagnostics and therapy in a specialized hospital. The correct tactics of psychological rehabilitation may have a successful outcome even in the clinical situations that earlier were assessed as fatal.

### **Availability of Materials**

The data for this case report are located at the National Specialized Infectious Diseases Hospital Zangiota 1.

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### Authors' Contributions

RI contributed to the conception of the work, patient treatment, editing and revising the manuscript, final approval of the manuscript. HA helped in data search, manuscript revision, final approval of the manuscript; GV participated in patient treatment, drafting of the manuscript. SI contributed to patient treatment, manuscript preparation and revision. All authors read and approved the final manuscript.

### Ethical Approval

All procedures performed were under the institutional and national research ethics standards and the 1964 Helsinki Declaration and its later amendments. This report was supervised and approved by the Ethic Committee of the Specialized Infectious Diseases Hospital Zangiota 1.

### Consent to Participate

Informed consent was obtained from the patient involved in the study.

### Consent for Publication

An informed written consent to the publication of the photos was obtained from the patient.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Abbreviations

CPAP	Continuous positive airway pressure
CPR	Cardio-pulmonary resuscitation
GAD-7	Generalized Anxiety Disorder scale
ICUS	intensive care unit syndrome
MOF	multi-organ failure
NIV	Non-invasive ventilation
PEEP	Positive end expiratory pressure
PICS	post-intensive care syndrome
PMA	psychomotor agitation
PTSD	Post-traumatic stress disorder
RMV	respiratory minute volume
RV	respiratory volume